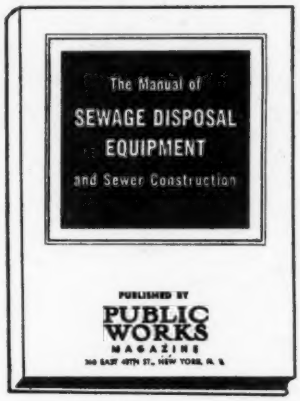
"A GREAT HELP

when working up data on Sewage Disposal"

Say Leading Sanitary Engineers



You who are "blueprinting now" will find no more useful book than the 1943 Manual of Sewage Disposal Equipment and Sewer Construction.

The Manual is not just a catalog but an expert digest of hundreds of catalogs together with a review of the latest methods. Descriptions of products are arranged for convenience in reference—by purposes to be served. A separate chapter discusses the most approved methods to be followed in each step in design and construction, and all products available for use in each stage are covered in appropriate chapters.

Known to engineers throughout the nation as the Standard Source of Unbiased Information on sewage disposal equipment, the Manual is an indispensable aid in choosing the right equipment or material to accomplish the purpose in mind.

CONTENTS INCLUDE:

Removal of Screenings and Grit
Removal of Fine Suspended Matter
Activated Sludge Treatment
Sewage Sludge Digestion and Gas Utilization
Oxidizing Beds
Disposal of Screenings and Sludge
Use of Chemicals
Pumps for Sewage and Sludge
Equipment for Operation Control
Maintenance of Equipment
Sewers and Sewer Materials
Maintenance of Sewers
Construction Materials and Equipment

If you don't have a copy of this valuable manual on your desk, write today for information on how to obtain one.

PUBLIC WORKS Magazine
310 E. 45th ST. NEW YORK 17, N. Y.

PUBLIC WORKS

Founded in 1896

Devoted to the interests of the engineers and technical officials of cities, counties and states

Vol. 75 No. 2

A. PRESCOTT FOLWELL, Editor

FEBRUARY CONTENTS

HIGHWAYS AND AIRPORTS

The Recommended Interregional Highway . . . 13
Highway Land Acquisition Costs and Practices . . . 21
Lining Roadside Shoulders in Texas . . . 23
Flight Strips for Postwar Service . . . 32
Earnings of County Highway Equipment . . . 38
Postwar Planning for Off-Street Parking Facilities . . . 41

SEWERAGE AND SANITATION

Building an Interceptor Sewer for St. Charles, Missouri. *By Richard W. Halteman* . . . 11
Effect of Dilution on Sludge Formed by Neutralizing Acid Wastes With Lime. *By Willem Rudolfs and Willem Rudolfs, Jr.* . . . 24
Contractor Responsible for Subcontractor's Debt . . . 28
Sewer Construction Claims for Extras . . . 33
New Standard Specifications for Sewer Pipe . . . 40
Sewage Gas Hazards . . . 40
The Sewerage Digest . . . 53

WATER SUPPLY AND PURIFICATION

More Water, Please! *By Archer B. Stuart* . . . 15
Pasadena, California, Water Department . . . 17
Wartime Precautions of Honolulu Water Works . . . 23
Control of Well Construction in Wisconsin . . . 30
Surplus Water Revenue Rebated to Customer . . . 30
Proof of City's Liability for Broken Water Main . . . 36
Water Rates Chargeable by City to Its Suburbs . . . 36
Repairing a Main Valve Without Shutting Off Pressure. *By Howard MacMillin* . . . 38
The Waterworks Digest . . . 49

THE WAR EMERGENCY . . . 7

Preference Rating for Sewerage Extensions
Postwar Planning in Illinois
Metal Scarcity Being Relieved
Sanitary Engineers Wanted for the U. S. Public Health Service
Return Ammonia Containers Promptly

GENERAL

A County Tax Map from Aerial Photographs. *By Daniel K. Kelly* . . . 18
Statistical Abstract of the United States . . . 47
Keeping Up With New Equipment . . . 56
Reader's Service Department . . . 63

Subscribers who wish an Index for Vol. 74 (January to December, 1943) can obtain one by writing to this office.

Published monthly by PUBLIC WORKS JOURNAL CORPORATION

Editorial and advertising offices: 310 East 45th St., New York 17, N. Y.

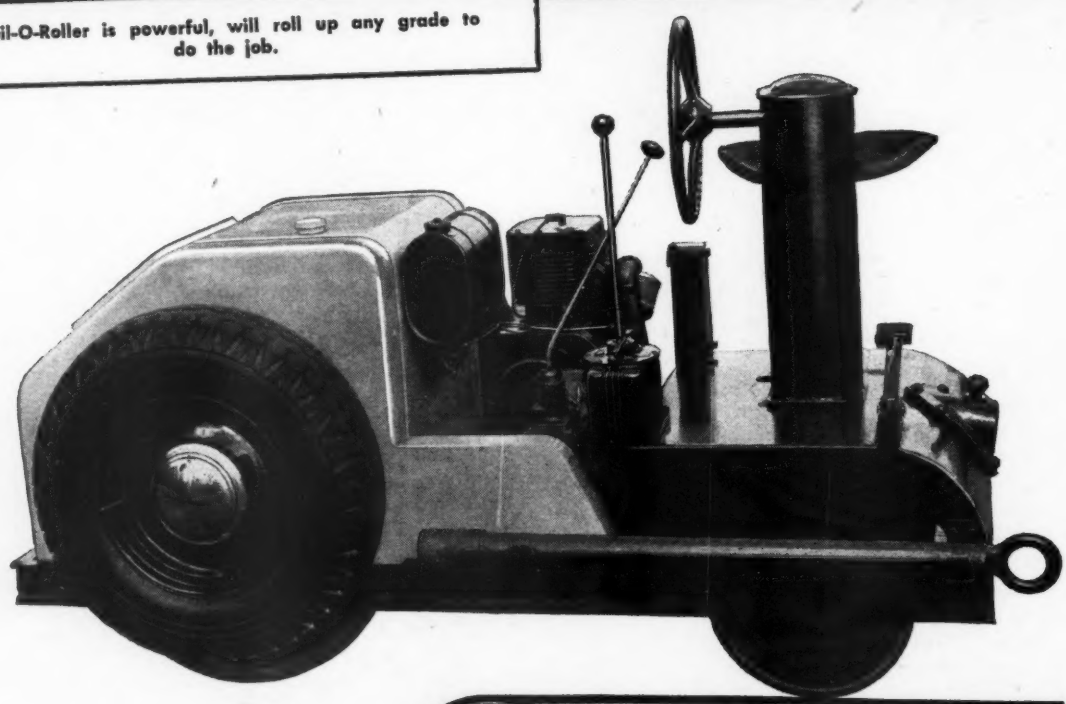
J. T. MORRIS, *President;* CROXTON MORRIS, *Treasurer;* ARTHUR K. AKERS, *Advertising Manager. Advertising representatives,* JAMES M. WELLS, *Western Manager,* Room 515, 612 No. Michigan Ave., Chicago 11, Ill.; ALONZO HAWLEY, 326 Bulkley Bldg., Cleveland 15, Ohio. SUBSCRIPTION RATES: U.S.A. and Possessions, Mexico and Cuba, $3.00; Canada, $3.50. All other countries, $4.00. Single Copies, 35 cents each except issues containing book-length texts, which are $1.00 apiece.

TRAIL-O-ROLLER

It Rolls! It Trails! Changes from one position to the other in 2 minutes time. Yet gives as much compaction as a 5 ton tandem roller. The Littleford Trail-O-Roller is used to roll roads, streets, highways, parking areas, airport runways, playgrounds, etc. For permanent work, roll each job with a Trail-O-Roller. It's easy to operate, compact and efficient in operation.

Operator sits in comfortable position in operating the Trail-O-Roller

Trail-O-Roller is powerful, will roll up any grade to do the job.



BLACK TOP ROAD MAINTENANCE EQUIPMENT LB SINCE - 1900 LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati, Ohio

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

THE WAR EMERGENCY

Preference Rating for Sewerage Extensions

Extensions of public sewerage systems costing less than $5,000 may now be made to building projects authorized under Conservation Order L-41 with a minimum of preliminary paper work, the Government Division of the War Production Board announced on January 6th.

Amendment of Preference Rating Order P-141 renders it similar to orders of the Office of War Utilities, which provide uniform procedures for expeditious installment of utilities extensions.

Under the old terms of P-141, sewerage systems might be connected with approved projects only after specific approval by WPB. Now all that is required is a certification by the system operator, delivered to the builder, for attachment to the latter's application for approval to begin construction.

The amended order also assigns a preference rating of AA-3 and an abbreviated CMP allotment symbol to orders for materials required by an operator to install extensions.

Postwar Planning in Illinois

The Postwar Planning Commission of the State of Illinois reported on January 14th that Illinois taxing units were active in preparing postwar public works programs and developing the projects toward the "Blue Print" stage. The State, through its Code Departments and the University of Illinois has reported programs for which detailed plans and specifications have been completed or are in preparation, totaling $121,368,700. Highway projects lead, with an estimated cost of $103,000,000.

Of the 102 counties, 62 have reported programs with projects totaling $96,028,689. Detailed plans and specifications are completed or in preparation for 46% of these programs, sketch plans are completed or in preparation for 28%, surveys are completed or in progress for 7%, and the programs are in the preliminary estimate stage for 19%.

Park districts, sanitary districts, and municipalities other than Chicago have reported programs with projects totaling $93,812,569. Detailed plans and specifications are completed or in preparation for 22% of these, sketch plans for 29%, surveys for 5%, while 44% of the programs are in the preliminary estimate stage.

Metal Scarcity Being Relieved

WPB announced in January that "alloy steels are now plentiful. However, facilities for rolling steel are still short and finished plate will be on the critical list for some time to come. Copper, magnesium, zinc and molybdenum, desperately short only six months ago, are now fairly plentiful. Practically all other metals, including tin, are expected to come off the critical list — barring unforeseen developments — during 1944." This does not mean that goods manufactured from these materials will at once become available for civilian use, for manpower shortage still exists, also shortage of other materials entering into such goods and of motors, gears, bearings, forgings and castings.

Sanitary Engineers Wanted for the U. S. Public Health Service

An examination for appointment as Assistant Sanitary Engineer and Passed Assistant Sanitary Engineer in the Regular Commissioned Corps of the United States Public Health Service is scheduled to be held at:

New York, N. Y., January 31, 1944; Washington, D. C., February 9, 1944, April 4, 1944; Chicago, Ill., February 17, 1944; San Francisco, Calif., February 28, 1944; Denver, Col., March 6, 1944; Kirkwood, Mo., March 9, 1944; New Orleans, La., March 22, 1944; Atlanta, Ga., March 25, 1944.

The oral professional, academic, and physical examinations will be held at places and dates given above. The final written portion of the examination will be given simultaneously at all places beginning on April 10, 1944. The written portion of the examination may be given at certain other stations of the Service where two or more regular commissioned officers are on duty, if request is made by an applicant.

Assistants must be between 23 and 32 years old; passed assistants under 40.

Compensation (including allowances for quarters and subsistence), $3,411 for assistants with and $2,975.50 without dependents. Passed assistants, $580 more.

Applicants should address the Surgeon General, U. S. Public Health Service, Washington, D. C., in their own handwriting requesting permission to appear before the board of examiners. The applicants should state their age, date and place of birth, present legal address, and whether a citizen of the United States, and the name of the professional school or college of which they are graduates, year of graduation, subsequent training and experience, and furnish a recent photograph and at least two testimonials as to their professional and moral character. Applicants of foreign birth must furnish proof of United States citizenship. If naturalized, naturalization certificate should be presented with the application. Candidates born in the United States who pass the entire examination will be required to prove citizenship before being offered appointment.

Return Ammonia Containers Promptly

Producers of ammonia announce that they are now able to take care of industrial users of ammonia, but have not enough cylinders and drums for transporting it. They believe that there are enough in service if they are kept in circulation, so thy urge users to order for immediate requirements only and return the containers as soon as possible.

The heavy hand of taxes...

The heavy hand of postwar taxes hangs over every family in America unless you do something about it. Obviously, Federal taxes cannot be lowered for years to come. But you *can* reduce or even eliminate municipal taxes with the profits a Fairbanks-Morse Diesel-driven Light and Power Plant can make for your city.

Start your future planning now. Investigate the qualities and low-cost service of a Fairbanks-Morse Diesel-operated Power & Light Plant for after the war. Be at the top of the list when deliveries are resumed.

Write: Fairbanks, Morse & Co., 233 Fairbanks-Morse Building, Chicago 5, Illinois.

BUY WAR BONDS

FAIRBANKS-MORSE

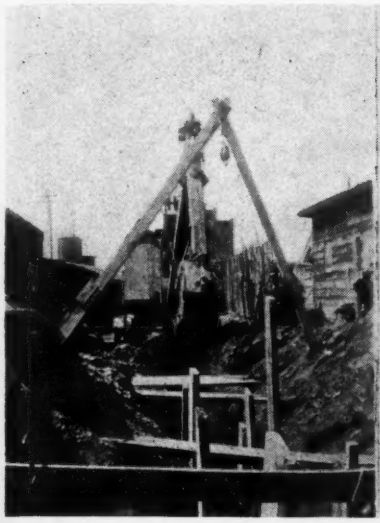
DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Diesels

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

PUBLIC WORKS Magazine . . . February, 1944

Vol. 75. No. 2



Back-hoe at work in a narrow alley.

A 40-foot crane excavating for the 18-inch sewer.

Ditch in rock-clay fill. Note cave-in under shed.

Building an Interceptor Sewer for St. Charles, Missouri

By RICHARD W. HALTEMAN

City Engineer, St. Charles, Missouri

Removing the sanitary sewage to an outlet below the city. How work was prosecuted in close quarters with intermittent rain and floods for over two months.

SOME few years ago, the U. S. Government through its War Department started work on a definite realignment of the channel of the Missouri river. The City of St. Charles, Missouri, began to feel effects of this change in the summer of 1940, the principal effect being the formation of sandbars between the dikes that had been built out into the river to force the channel into its new alignment away from the St. Charles side of the river.

All of the older sewers in the town, most of which were combined sewers, emptied directly into the river, and when the stage was extremely low the sewage discharged onto these sandbars and consequently stagnant pools formed at the base of the river bank, causing obnoxious odors throughout the downtown district and becoming a potential source of an epidemic. Naturally these pools became a source of concern, and the city sought some way of eliminating them. It finally decided to build an interceptor sewer parallel to the river bank to intercept all sanitary sewage and empty it downstream at a point where river water was close to the bank when at the lowest stage known.

Appeals were made to the U. S. Government for aid in building this sewer and finally, after many months of effort, a grant of $20,000 was made to the city by the Federal Works Agency to partly compensate the city for the necessity of installing a sewer. The citizens of St. Charles had previously passed a bond issue for $24,000 towards the cost.

The preliminary work had long been done, plans and specifications were complete, and a pipe line license had been obtained from the Missouri-Kansas-Texas Lines, whose right-of-way parallels the river along the total river frontage of the city.

The interceptor sewer designed consisted of 4,225 ft. of 24″ to 15″ pipe, crossing 13 streets, each with a sewer, some of them combined, which were connected to the interceptor. Each of these intersections presented an almost entirely different problem, and the con-

The author, Richard W. Halteman, City Engineer.

struction used in making the connection in some instances might be considered unorthodox; but proved satisfactory to all parties concerned. Most of the sewers intercepted were of vitrified clay, but the combined sewers were of concrete bottom and stone arch construction. All of the latter were found to be in perfect condition, but several of the vitrified clay sanitary sewers were broken, due most probably to excessive pressure.

Most of the intercepted sewers were laid more than fifty years ago, and in all cases our only information about their location was where they came through the river bank. The grade at the interceptor, therefore, was largely a matter of guess work, but, except for one instance, all connections with the interceptor were accomplished without relaying the original sewer or changing the existing flow line of the storm drain. The sanitary sewers were connected directly to the interceptor; where possible the river end was left open to provide an emergency outlet. In the case of combined sewers, the sanitary flow was dropped into the interceptor with an 8″ pipe so that, in times of rainfall, a certain amount of surface water will find its way into the interceptor. However, the combined sewers are on such steep grades that little trouble is anticipated from excess water in the interceptor. As a matter of fact, several heavy rains have occurred since the completion of the outfall and it has not at any time run more than half full.

The topography necessitated laying the interceptor on a flat grade, but we believe that the sizes of pipe used will amply take care of any overload in the line during rains, although at times it may run under pressure. The grades were designed for a minimum velocity of 3 ft. per second and for a maximum capacity at the outfall of 12.2 cu. ft. per second. The design was based on an assumed water consumption of 200 gal. per capita per day, with 4 persons per dwelling and a factor of safety of 3. Using these figures, the maximum flow at the outfall was calculated to be 7.6 c.f.s.

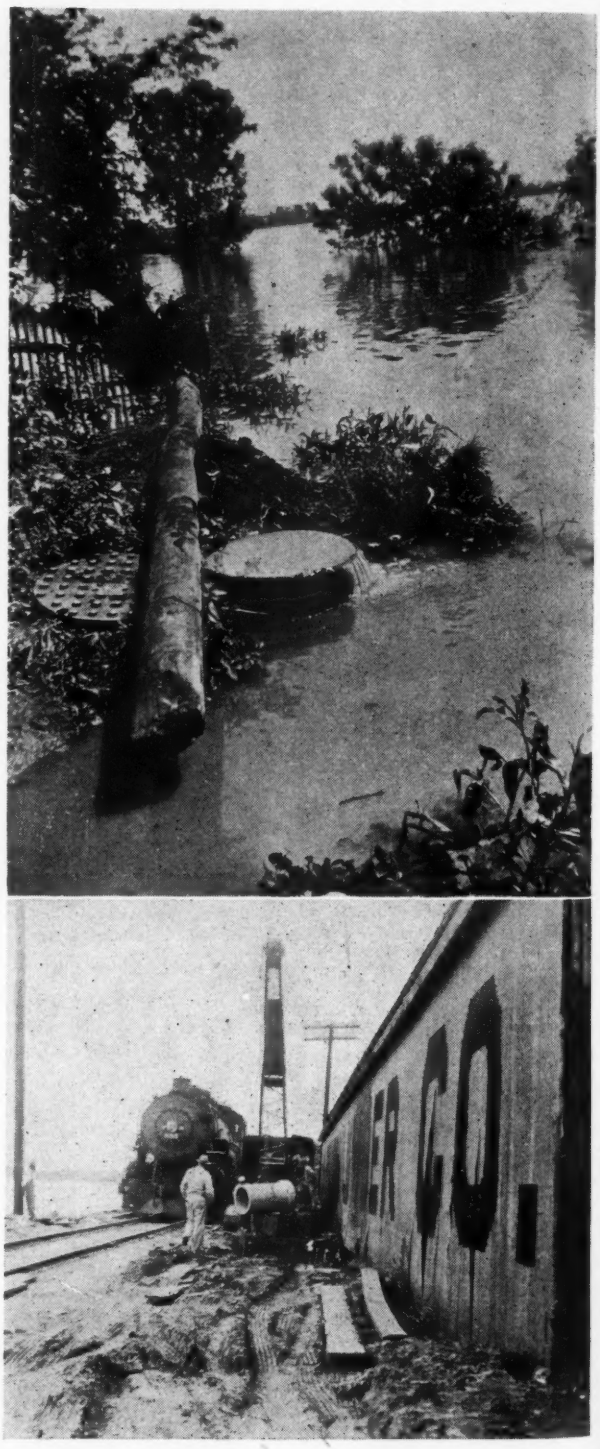
Concrete pipe was used throughout the job, with oakum and cement grout joints.

The plans provided for 746 ft. of 24″ pipe, 1330 ft. of 21″, 1250 ft. of 18″ and 904 ft. of 15″, with 15 manholes having a combined depth of 183 ft. The depths of the sewers varied from 17 ft. to 3 ft. The cost of actual construction was estimated at $42,500, and the total cost at $47,000. The Victory Construction Co., of Brentwood, Mo., submitted the lowest of three bids received and was awarded the contract.

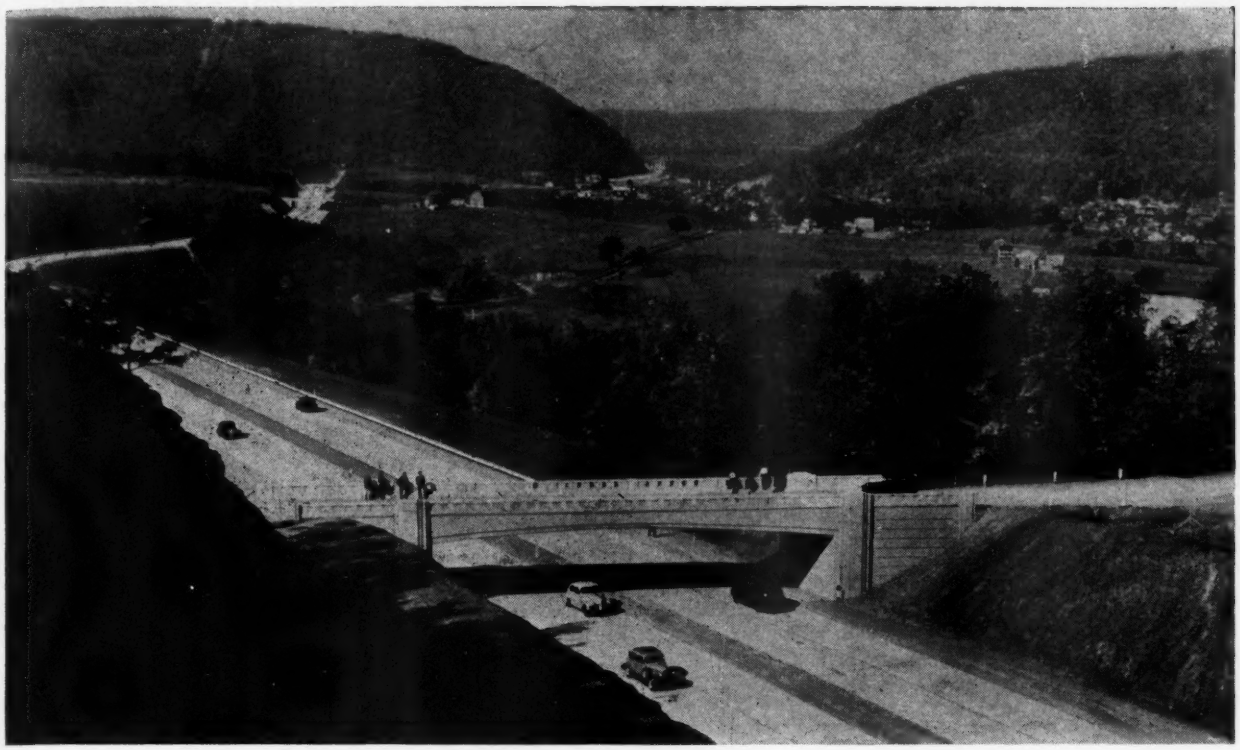
The contractor started work on April 14, 1943. The stage of the river at this date was too high to permit starting at outfall, so it was begun at the manhole at Sta. 33 + 25, the beginning of the 15″ line. This line, 904 ft. long, was completed in five working days, all digging being done by hand, since the trench was only 8 ft. to 3 ft. deep and the site inaccessible for trenching equipment. No difficulties were experienced here, and only one problem—holding the pipe on the top edge of a 12 ft. bank at a creek crossing, which was solved by rip-rapping the bank to the top of the exposed pipe and then covering it with earth.

When this had been completed the river was still high at the outlet, and work was begun on the 18″

(Continued on page 20)



Top—Manhole at upper end of interceptor. Flood is over the tracks on the right. Bottom—30-ft. crane working on 24-in. line. Note tight conditions. Train is in motion.



The Pennsylvania Turnpike, between Harrisburg and Pittsburgh. Two 24-ft. lanes divided by a 10 ft. strip, with limited access.

The Recommended Interregional Highway

After more than two years of study of all available statistics, a committee of experts of recognized ability select the routes for an interregional highway covering the entire country.

THE most important news in the highway field for many years is President Roosevelt's recommendation, made January 12, that Congress make the necessary provisions for the adoption of a 33,920-mile interregional highway system, and for spending $750,000,000 a year for ten to twenty years in the construction of it.

This recommendation was made in connection with transmitting to Congress the report of the National Interregional Highway Committee, which was appointed by the President in 1941 and consisted of Thomas H. MacDonald, Commissioner of Public Roads, Chairman, and G. Donald Kennedy, State Highway Commissioner, Michigan; C. H. Purcell, State Highway Engineer, California; Frederic A. Delano, Chairman, National Resources Planning Board; Dr. Rexford G. Tugwell, Chairman, New York Planning Commission, and Harland Bartholomew, St. Louis, Missouri, city planner. The late Governor Bibb Graves of Alabama was a member of the original committee.

The report of about 200 pages explains at length the bases upon which the selection of the several unit highways of the system was made, and supplements this with discussions of Mid-City Terminals of Express Highways, Limiting Access to the Interregional Routes, Acquisition of Rights of Way, Principles of Landscape Design, Standards and Features of Roadway Location and Design, and the Construction of the System. Space in this issue permits only a brief discussion of the location of the routes that make up the system; we expect to deal in later issues with other features of the report.

Several systems were studied, three of them exhaustively: these being the one adopted, one of 48,400 miles and one of 36,000 miles.

In the selection of all these systems, one common objective prevailed: To incorporate within each of the several mileage limits adopted, those principal highway routes which would reach to all sections of the country, form within themselves a complete network, and jointly attract and adequately serve a greater traffic volume than any other system of equal extent and condition.

Of the total mileage of the recommended system, 29,450 miles are in rural sections, and 4,470 miles are urban streets. Although the latter figure is only about 12½% of the total mileage, it is recommended that, during the early years of construction, $500,000,000 a year be spent on the urban sections and $250,000,000 on the rural. In explanation of this the committee says: "Two decades ago the most obstructive deficiencies existed on the rural roads. City streets were relatively ample in their traffic capacity. Today these

The general location of routes of the recommended interregional highway system.

conditions are reversed. It is within and in the vicinity of the cities and metropolitan areas that through travel now experiences its most serious resistance and delays, which are abundantly shared by the heavy intramural local traffic that tends to congregate on the same arterial routes."

The urban sections include routes around as well as into and through the urban areas.

The 33,920-mile interregional system recommended follows in general routes of existing Federal-aid highways and much of the work would involve relocation, improvement and modernization of the existing roads to recommended standards.

The proposed network would be brought to high standards which would eliminate such traffic nightmares as congestion, stop lights, cross traffic, headlight glare, constricting roadside development, steep hills, sharp curves, and narrow pavement.

Although the system in miles represents scarcely over one percent of our entire highway and street system, it will probably serve not less than 20% of the total street and highway traffic. It connects directly all cities of 300,000 or more population. It reaches 59 of the 62 cities of population between 100,000 and 300,000 persons; and 82 of the 107 cities with populations between 50,000 and 100,000. It reaches only 121 of the 213 cities of population between 25,000 and 50,000; and only 295 of the 665 cities of 10,000 to 25,000 population; but it was estimated that to reach directly all cities of 10,000 and more would require a system of 92,900 miles, and one that would less satisfactorily serve the larger cities.

Considerations other than merely connecting large cities entered into the selecting of the routes. Among them were relation to population distribution—the system reaches 82.6% of the total urban population of the nation; to manufacturing activity—"The recommended system closely approximates the system of optimum extent from the standpoint of service to manufacturing industry;" to agricultural production —it closely approaches the greatest service to agriculture obtained by any of the systems; to situs of motor vehicle ownership—68.7% of the total 1941 motor vehicle registrations were made by residents of countries located directly on the system; to areas of post-war employment release—the proposed routes, particularly those most needing immediate major improvement, pass through areas where maximum post-war unemployment seems most probable. Also considered were location in relation to military and naval establishments and war industry, and to principal topographic features.

Selection of the routes interconnecting the major cities was based on the following conclusions:

1. The system, if it is to attract and serve a reasonably large proportion of the total highway movement, must connect as many of the larger cities of the country as its limited mileage will permit.

2. Whatever other facilities it may provide, the system must incorporate adequate routes leading directly into the larger cities, including at least most of the cities of 10,000 or more population.

3. Especially in the more densely populated sections of the country, the general directness of the routes between larger cities should not be sacrificed for close approach to cities of substantially less than 10,000 population. When these small cities lie conveniently in the path of direct routes, they may be adequately served by a skirting location of the main route. Such a location will generally be in the interest of the preponderant part of the traffic.

Construction after the war would, committee members pointed out, utilize productively some of the manpower and industrial capacity then available. Past experience was cited to show that the construction of

(Continued on page 47)

More Water, Please!

By ARCHER B. STUART
City Engineer, Healdsburg, Calif.

Lowered water table and increased consumption threatened to render the pumps incapable of supplying the latter. The problem was solved temporarily by ingenious combination of materials from the scrap pile to make a "gooser."

OUR city was faced with an alarming drop in the level of the water table at the well field. This was due to an unfortunate combination of circumstances over which we had no immediate control, and for which we could effect no permanent remedy before a serious water shortage would develop. In desperation we adopted the practice of small pump manufacturers in using a jet recirculation of a portion of the water pumped to attain higher-than-normal lifts for centrifugal pumps. We were crowded for time, hard pressed for usable materials, and considerably concerned over proper design; but the results carried us through the critical period, and the strange assembly of available junk we put together is still doing yeoman service seven months after installation, during which we struggled with the red tape of the W.P.B. and the uncertainty of pump manufacturers' production schedules.

The Pumping Plant. Our water supply is obtained from shallow drilled wells in a field approximately seventy feet wide by three hundred feet long, about one hundred yards from the Russian river. There are six 12" double-cased gravel-envelope wells 50 feet deep. An average log of borings shows 18 feet of top soil; 10 feet of sand; 12 feet of mixed sand, gravel and boulders; and 10 feet of fairly clean coarse gravel. Below this 50-foot depth is at least 150 feet of solid blue clay, changing almost to shale at 200 feet.

Six-inch suction pipes in the wells run through shut-off and check valves to a 12-inch suction header, which is 10 feet below the surface and extends some 700 feet to the pumping station. The static water table elevation varies from fifteen feet below the suction main in summer, to fifteen feet above it during river flood stages.

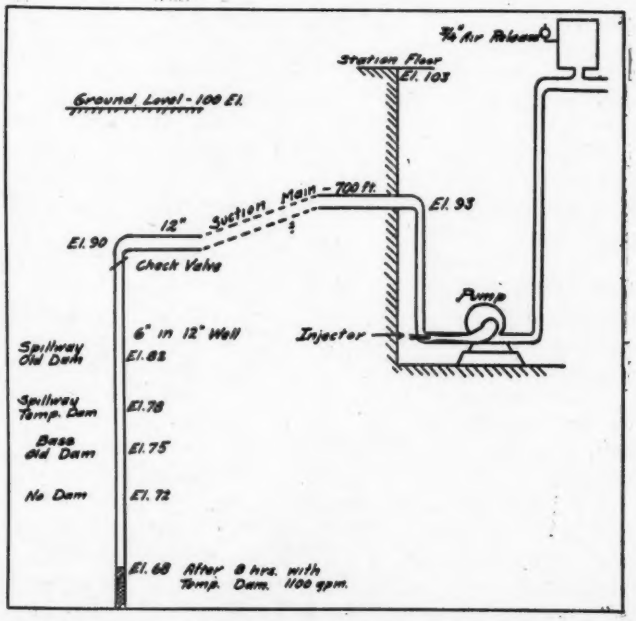
The original pumping plant had comprised two triplex plunger pumps in a pit at suction main level, which loudly and laboriously, but with surprising efficiency, sucked a limited amount of water 28 feet up from old dug wells and pushed it another 150 feet higher into a hilltop reservoir. When these pumps were nearly ready to fall apart we decided upon a system of bored wells and centrifugal pumps, and installed two 6" De Laval centrifugal pumps of 1,200 gpm capacity, double suction, with 100 hp G.E. motors; one in 1928, the other in 1930. The new wells were easy, but lowering the suction main while keeping it in service presented difficulties; which were sidetracked by not lowering it but deepening the pump pit only, the suction main thus acting as a siphon.

This proved quite satisfactory for fifteen years, but in the spring of 1943, a receding water table, increased demand for water, and some small elusive air leaks in the suction line caused it to break suction, the pumps to lose prime, and the reservoir supply to dwindle while we waited for the water table to recover sufficiently for another spurt of pumping with reduced capacity and alarming cavitation.

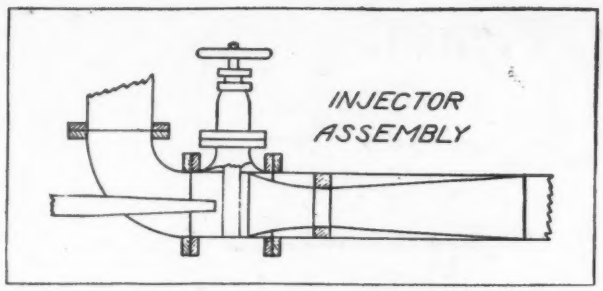
Drop in Water Table. There were two main reasons for the lowering of the water table, aside from the increased demand for water. A collapsible timber dam in the river a half-mile below our wells, which had served to create a beautiful recreational lake in summer, had raised the water in the wells an extra five feet during the heavy pumping period. The cut-off wall of the dam base also afforded absolute control of erosion in the river channel, thus further guaranteeing an unfailing supply of water in the well field at a reasonable level.

During 1942 this old dam washed out, which lowered the river by six feet. Replacement of the dam is out for the duration, but we managed to limp through the 1942 season with a temporary gravel dam which raised the water four feet in the river and two and a half feet in the wells. However, with the dam base gone, the high-water flows of the following winter cut the river channel three feet deeper, and left us this spring with the temporary gravel dam doing little more than restoring the drop due to channel erosion. With this lowered water table our pumps were inadequate for heavy pumping, and we cast about in desperation for some quick and practical means for sucking harder on the wells.

A higher gravel dam in the river would have been neither safe nor dependable; lowering the suction



Healdsburg pump and well as now installed. The air release valve is tapped into the side of the air chamber. The feed pipe for the jet nozzle takes off from the pump discharge header.



Sketch of the injector assembly.

main system was out of the question; and a booster pump system would require time and pumps which were not available.

The second reason for the lowered water table was the fault of the Weather Man. Usually there is considerable rain in April and May, tapering off in June, but even spoiling an occasional Fourth of July parade. However, this particular year of 1943 saw not a drop of rain from the last week in April until a light shower in October. Unprecedented, and entirely unfair to organized pumping,—because the ground water supply thus depended upon seepage and storage much earlier and over a more extended period than we had ever experienced before.

Increased Use of Water. Water consumption at the same time increased above normal use for several reasons: (1) Lack of rain caused lawns and gardens to dry out fully two months ahead of the usual time; (2) two new war-time industries alone used 25% of the normal demand on the plant; and (3) Victory Gardens. This last item deserves a paragraph all by itself.

In a laudable wave of winter patriotism the City Council decreed that Victory Gardens should have free water on the following basis: for each 100 square feet of bona fide truck garden the city would deduct one hundred cubic feet of water from the monthly meter readings before computing the customer's bill. This sounded safe, reasonable and slightly encouraging, and was expected to produce more good will than water use. The estimate for our little burg of 2,500 population was one hundred gardens of five hundred square feet average size. We were a bit low on this guess, because there turned out to be nearly six hundred gardens from one thousand square feet to a full acre in size! Service clubs even plowed vacant lots and furnished supervision and advice free to all takers of garden plots. And so the already sad story got a real kick in the pants, and gray hair appeared almost overnight on the heads of the waterworks personnel.

The result was that we were pumping nearly twenty-four hours a day long before summer should have started, with no safety factor for a run of hot days, a minor breakdown or a large fire. Any of these things could have upset our little apple cart completely.

In the month of May, for the five previous years, we had pumped an average of 450,000 gallons per day, at a rate of 1,250 gpm, with a peak daily consumption approximated fifty per cent over this amount. But in May, 1943, we pumped an average of 846,000 gpd, with the pumps delivering only 1,030 gpm. The peak day was 1,248,000 gallons, and to pump this required twenty-five hours including periods for water table recovery. Do you wonder that we had "ants in our pants," and were allergic to fire sirens and to farmers' dire predictions of hot spells with no rain? We tried throttling the pump discharge to a rate at which a steady supply could be maintained and found that this rate would be less than 800 gpm. This was not satisfactory, however, as each operator tried to coax out a little more water, and ran into the same old grief.

"The Gooser." For several months we had been considering the possibility of using a "gooser" in an emergency, but had found it impossible to obtain either authentic design data or quick delivery of the materials to make the parts. Now we were caught short in the emergency; but during the post Pearl Harbor months the whole waterworks industry has had to learn to be resourceful. Old junk piles and our modest machine shop had saved the day in several tight squeezes, and they came to the rescue again.

One of our De Laval pumps had an elbow, valve and nipple in the 7″ suction pipe which gave a 4 ft. straight shoot to the pump inlet, and we chose this pump for the experiment, as the jet could enter the back of the elbow and the three elements of a Venturi section could be slipped into the pipe at the pump suction. For the jet nozzle we found a truck torque tube with a beautiful smooth taper from 2½″ I.D. down to 1 1/16″ at the universal joint end. This small end was turned back in the lathe until it had an I.D. of 1⅛″ and the inside was polished with emery cloth on a stick. The reducing section of the Venturi tube was "modified" with sledge hammer and lathe from the differential housing casting of a Fordson tractor. This resulted in a smoothly rounded, tapered piece eight inches long reducing from 7″ to 4½″ at the throat, which latter was turned from the hub of a broken cast-steel pump gear. The expanding section presented a problem until a timely automobile collision broke off a Greenberg fire hydrant. The "bury" (the riser increasing from the 4″ service to the 6″ body of the hydrant) was broken with a longitudinal crack which would make it difficult to repair, but we could make good use of it! This riser was turned out (quite a job for us) from 4½″ at the throat to 7″ at the discharge end, giving a smooth taper 24″ long.

These three pieces were tack-welded together and installed in a horse trough for testing. On the discharge end we caulked an elbow to which could be added vertical lengths of 6″ sewer pipe, and the nozzle was slid through a hole bored in the end of the trough to get the proper adjustment. We found that the greatest static push occurred when the end of the nozzle was 12″ from the throat. A check was also made for maximum discharge by removing vertical pipe sections until a good flow was obtained, and then the nozzle again adjusted for best performance. This turned out to be the same 12″, which was fortunate in another way, as this gave a clear 4″ for the gate of the suction valve to operate normally. So our baby was installed with a prayer and fitting ceremonies consisting mostly of haste.

Results. Before installation, we had been pumping about 1,030 gpm at 23 inches of Hg., which gradually fell off in two or three hours to 850 gpm and 25 inches of Hg., at which point, due to breaking suction, it was necessary to shut down at least an hour for water table recovery before pumping could be resumed. After installation of the "gooser" pumping started at 1,230 gpm, net, and gradually dropped to 1,100 gpm after twelve hours. Initial pump suction vacuum was 12 inches of Hg., rising to a maximum of 15 inches. On shorter periods the average pumpage was 1,175 gpm.

The jet recirculates 250 gpm, about which there appears to be a general misconception. Use of this jet

(Continued on page 42)

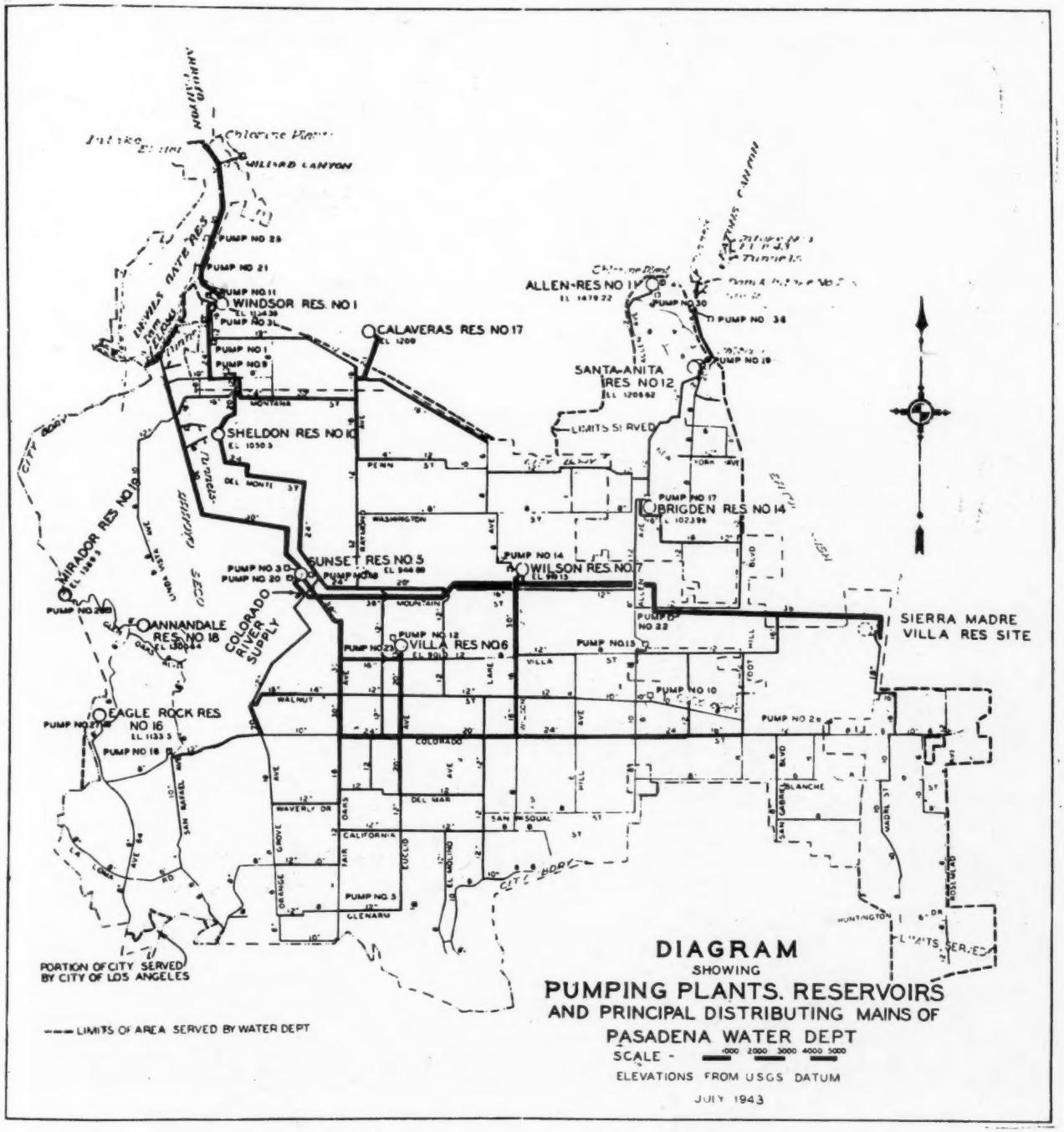
Pasadena, California, Water Department

Supplies obtained from twenty sources are distributed to 86,500 customers; the system including 12 reservoirs and 23 pumping stations. Plans have been made and reserve funds are in hand for a large amount of postwar construction.

THE annual report for the year ending June 30, 1943, of Morris S. Jones, chief engineer and general manager of the water department of Pasadena, California, is one of the most successful we have seen in giving a comprehensive, clear statement of the many activities and finances of an intricate water system. This system obtains its supply from twenty sources—wells, impounding reservoirs and rivers; and distributes it through 368 miles of mains to about 86,500 consumers. Incidentally, this report covers the 30th year of the system's operation.

The department was organized Nov. 1, 1912, and purchased three private water companies with 9,900

(Continued on page 40)


WILLARD CANYON
WINDSOR RES. NO 1
CALAVERAS RES NO 17
SHELDON RES NO 10
ALLEN RES NO 11
SANTA ANITA RES NO 12
BRIGDEN RES NO 14
WILSON RES NO 7
SUNSET RES NO 5
VILLA RES NO 6
ANNANDALE RES NO 18
EAGLE ROCK RES NO 16
VIRADOR RES NO 19
SIERRA MADRE VILLA RES SITE
COLORADO RIVER SUPPLY
PORTION OF CITY SERVED BY CITY OF LOS ANGELES
LIMITS OF AREA SERVED BY WATER DEPT
DIAGRAM
SHOWING
PUMPING PLANTS, RESERVOIRS
AND PRINCIPAL DISTRIBUTING MAINS OF
PASADENA WATER DEPT
SCALE - 1000 2000 3000 4000 5000
ELEVATIONS FROM USGS DATUM
JULY 1943

NAME Montgomery, S.H.
ADDRESS 1551 River Rd.
Greenwood, Miss.

SEC 28 TWP 19 RANGE 1 E
PARCEL NO — MAP NO 50
CITY — SUBDIV —
BLOCK NO — LOT NO —
BEAT 3 SCH. D Greenwood
DRAINAGE DISTRICT None
HOMESTEAD No

DESCRIPTION I D B 96 PAGE 136 , N ½ of N ½

YEAR	GRAND TOTAL	CULT. LANDS ACRES	CULT. LANDS VALUE	BUILDINGS VALUE	TIMBER LANDS ACRES	TIMBER LANDS VALUE	UNCULT. LANDS ACRES	UNCULT. LANDS VALUE	TOTAL ACRES
1943		145.22			none		8.1		153.32

BUILDINGS: RESIDENCES — BARNS — TENANT HOUSES —
MISCELLANEOUS —

Property record card, Form P.I. 1

A County Tax Map

By DANIEL K. KELLY
County Engineer, Leflore County, Mississippi

LEFLORE COUNTY, MISSISSIPPI, which lies in the Yazoo Delta section, is largely agricultural, with one city of 15,000 population (Greenwood) and seven smaller towns. Four rivers traverse the county, and there are many lakes, brakes and creeks which cause the cultivated areas to be very irregular. Planters were constantly clearing up new land. The result was that the Tax Assessor's Office had no up-to-date information on the amount of land each owner had in cultivation and what improvements existed.

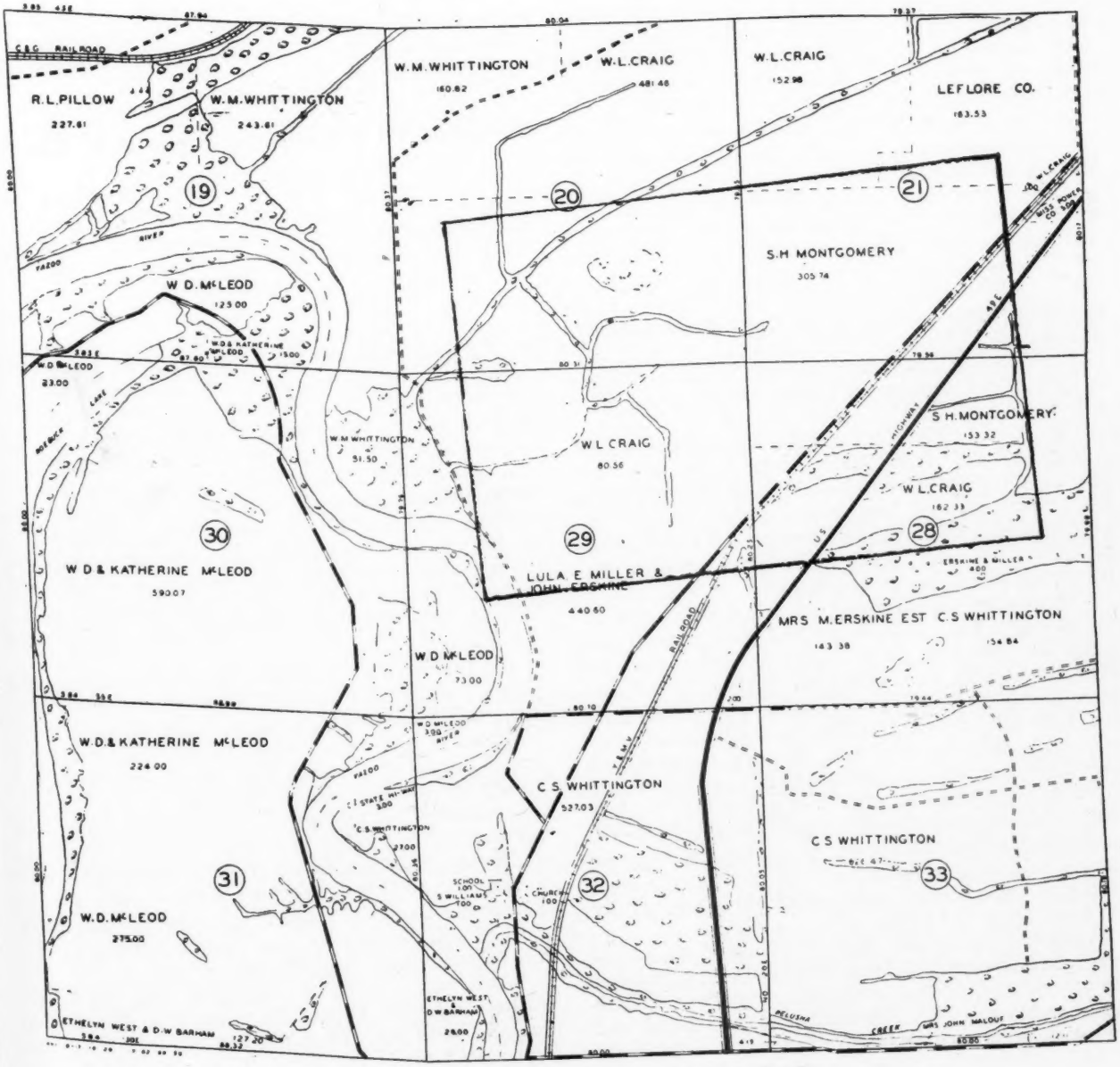
The Board of Supervisors, which equalizes taxes, realized that there were inequalities in the tax rolls but had no definite data to guide them in adjusting them; so, on the recommendation of the Tax Assessor, the board directed the County Engineer to have a tax map made of the county.

There had been no official map of the county made before, although there were several unofficial small-scale maps that were privately made; but even these were out of date and inaccurate. On recommendation of the County Engineer, a WPA project for preparing such a map was sponsored by the county, the WPA providing the labor and the county furnishing the materials and technical supervision.

An aerial photograph of the area shown in the rectangle on the map on page 19, at twice the scale of the map

x ap Made From Aerial Photographs

How Leflore County, Mississippi, prepared a tax map, showing the cultivated, wooded and waste land on each property, using AAA aerial crop control maps.



One of the sheets of the atlas, one-fourth the actual scale

Investigating the possibility of making the map from aerial photographs, we learned that we could obtain a set of photographs which had been taken by the AAA to be used to control crop allotments. These photographs are on a scale of 660 feet to the inch (i.e. eight inches to the mile), and this scale was adopted for the county tax map.

The WPA assigned seven workers to the project, two draftsmen and five research workers. The research workers were assigned to taking off the tax rolls and checking these with the deed records in the Chancery Clerk's office, so as to determine the owners of record and correct descriptions of their property in each section. These were written on cards (which were called Form P.I. 1).

The work was greatly facilitated by the fact that the county has been sectionalized by the Public Land Survey, into Ranges, Townships and Sections. The county lies within Ranges 1 and 2 East and 1 and 2 West (Choctaw Meridian) and between Townships 16 and 22 North (Choctaw Base Line). (We found one error in the legal description of the county, but this was corrected by the state legislature, which was in session at the time.)

The Chancery Clerk made available the official government plat book, which gave the dimensions and bearings of the township and section lines, and the total acreage of each section. The draftsmen plotted these sections on the 660 feet to the inch scale from the plat book data, using tracing paper sheets 30″ x 30″. We plotted a quarter township (9 sections) on each sheet, thus making a drawing approximately 24″ x 24″, leaving a substantial margin.

The natural features that showed on the plat book were plotted on the paper tracing sheets at the proper scale, and other topographical data available from other maps (such as the one inch to the mile quadrangles of the Geodetic Surveys) were plotted. These significant data made it much easier to identify the photographs.

The property lines were then plotted from the descriptions furnished by the research workers (on Form P.I. 1).

The AAA aerial photographs showed the woods, cultivated land, rivers, lakes, roads, fences, etc.; but of course did not show the section and township lines. So the problem now became one of identifying lines on the photographs. We had constructed for this purpose a tracing table, which had a glass top with electric lights and reflectors underneath.

The quarter township paper tracing, which showed the property lines and owners and some natural features, was placed on the tracing table. The corresponding photographs were identified by the natural features and placed under the tracing and moved back and forth until the natural features checked, and property lines could be identified. Enough of these lines were made to coincide with those of the paper tracing to orient the whole photograph. It was surprising how easily the lines of the whole photograph fitted into the section and property lines on the tracing. In some instances field measurements had to be made, or the scale of the photograph had to be adjusted. But generally the two coincided satisfactorily.

When the section and property lines of the photograph and tracing had been identified, the cultivated land, woodland, brakes, roads, etc., were traced from the photograph. Then the cultivated, woodland and wasteland were separately planimetered and the areas of each determined. These areas were noted on each property subdivision of each section.

After each paper tracing had been completed and checked, a cloth tracing was drawn in ink, and cloth B.W. prints made.

An index map of the county was prepared, which showed the quarter township plates by number. The whole set of sheets was made into an atlas of seventy-five plates.

The property ownership records (Form P.I. 1) were then typed on 5 x 8 cards and filed by Range, Township and Section, as this is the method the Tax Assessor uses. On each ownership card were listed the total acreage, number of acres in cultivation, woodland and wasteland, respectively. (This information was taken directly from the map.) There were also spaces for valuations (to be filled in by the assessor).

In reviewing appeals, the Board of Supervisors could determine from the map the areas of cultivated and uncultivated land, the highway, railroad, drainage and other facilities and improvements, and thus intelligently decide the questions affecting valuations.

The AAA makes new maps at approximately five-year intervals. By acquiring a new set of photographs each time, the county can bring our map up to date at nominal expense.

A separate atlas of the several towns is being made. These towns were blocked out of the county map, but after the map of each town is made, it is checked with the photographs.

Building an Intercepting Sewer at St. Charles

(Continued from page 12)

line at Sta. 27 + 55, laying the 570 ft. to connect with the 15″. A Lorain 55 crane with a ¾ yd. clam shell was used on this stretch, which was completed in seven working days. As a part of this work, a sand bin with a concrete base had to be removed and replaced.

The river now, April 29th, had fallen to stage 17.5 and work was started at the outfall, using the crane. At the same time a ½ cu. yd. Byers back hoe was started at Sta. 20 + 52.7, the beginning of the 18″ pipe. The crane was making good progress through a fill of 12 to 15 ft. of foundry slag and 3 to 5 ft. of sand, when rain began and was almost continuous during the next 12 days, and the river rose 9.1 ft., which was the crest on May 22. After several attempts to get some work done, the job was shut down. By June 5th the river had dropped to 18.5, but more rain fell and the river rose again to a crest of 33.55 on June 25.

No further work was done on the interceptor until July 21, when work was resumed above Sta. 20 + 52.7, using a Lorain 40 with a ½ yd. bucket in place of the backhoe. Where the work had stopped the trench had caved in due to rain and flooding until it was practically the width of the 20 ft. alley.

Trenching machines were not used in this work because there was only a small percentage of the entire length where sufficient room was available to maneuver one; the crane worked to much greater advantage in poor ground where work was often stopped until shoring could be placed, and was a great aid in removing old timber and piling.

Work was renewed at the outfall with the Lorain 40 and a ¾ yd. bucket. Here the pipe was laid in running sand for 276 ft.; a 2 x 12 or 2 x 10 shoe was placed under the barrel of the pipe and dry-mix concrete rammed around it to above the spring line.

(Continued on page 28)

Highway Land Acquisition Costs and Practices

Study by the Public Roads Administration of the right-of-way costs of the Three-State Highway, and difficulties encountered in acquiring land in rural, suburban and urban areas.

PUBLIC AUTHORITIES, particularly those concerned with highway transport, have known for some time that the construction of new highway facilities and the modernization of existing roads have been impeded by prohibitive costs of land acquisition and almost insurmountable legal and administrative obstacles. Yet until recently, little organized effort had been directed toward the investigation and elimination of these difficulties which, in the aggregate, constitute the so-called right-of-way problem. In 1939, the Public Roads Administration undertook a brief investigation of the Three-State Highway, with the dual objective of ascertaining highway right-of-way costs and revealing such land acquisition difficulties as may be expected to occur on a long stretch of highway traversing rural, suburban, and urban areas devoted to a variety of land uses.

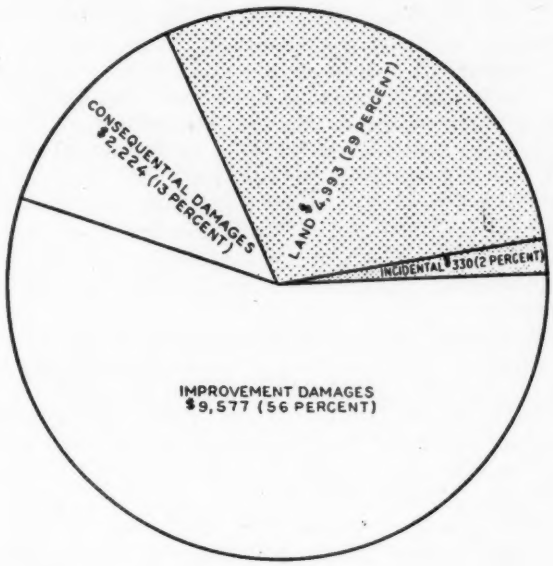
The findings of this study, as reported by David R. Levin, were published in the December issue of "Public Roads." The data occupy fourteen pages, a summary of which is given herewith as offering suggestions to highway bodies confronted with similar problems.

Mileages, areas, number of parcels.—As of September 1939, the right-of-way for 72 miles of a proposed 161-mile highway improvement had been obtained, involving 1,065 acres of land of which 83 percent was rural, 9 percent suburban, and 8 percent urban. A total of 835 parcels was acquired, averaging 11.6 parcels per mile of road. Of the total area acquired, 67 percent consisted of agricultural lands, 21 percent was residential, and the remaining 12 percent was devoted to other uses. Although commercial property represented but 2 percent of the area acquired, it accounted for 20 percent of the entire cost ($1,228,281) of the acquisitions.

Condemnation, donation.—In acquiring more than a thousand acres of land, 6 percent had to be condemned. Resort to court proceedings is likely to add a minimum of from $300 to $400 to the costs of a given acquisition. Donations were few, except in Milwaukee County, Wis., where the practice seems to prevail of offsetting the benefits accruing to property from an improvement against the value of land acquired, one invariably canceling the other.

The costs of average condemnation proceedings include compensation for witnesses, experts, commissioners, court reporters, and publication services. If there is obstinacy in controversy over values it may be advantageous in some cases for highway authorities to compromise by offering an amount somewhat in excess of the appraised value of a property rather than resort to court action.

Wisconsin award system.—The so-called statutory award system in Wisconsin seems to expedite the acquisition of lands and the construction of highways.


CONSEQUENTIAL DAMAGES $2,224 (13 PERCENT)
LAND $4,993 (29 PERCENT)
INCIDENTAL 330 (2 PERCENT)
IMPROVEMENT DAMAGES $9,577 (56 PERCENT)

AVERAGE TOTAL COST PER MILE = $17,124 (100 PERCENT)

Average cost per mile of land, damage, and incidental items

The State or a county makes an award for the value of land and damages and tenders that amount to the property owner. Construction may commence immediately afterward. Illinois has no such summary procedure.

Total acquisition costs.—The average total cost of land acquisition per mile of the Three-State Highway was $17,124; of this total, 29 percent represents the cost of "bare" land, 69 percent the amount of damages, and 2 percent the out-of-pocket expenditures for services incidental to acquisition.

Population density.—Although only 8.7 percent of the area acquired was in suburban territory, 16.0 percent of the total cost of $1,228,281 was incurred therefor; 8.4 percent of the area, located in urban sections, was assigned 19.3 percent of the total cost; and 82.9 percent of the area was in rural places and accounted for 64.7 percent of the total cost.

Costs per mile and per frontage-mile.—The average cost per frontage-mile for all property acquired was $9,812. The average cost in rural areas was $7,580 per frontage-mile, in suburban areas almost twice as much, and in urban places more than four times the rural average. These frontage mileages translated into ordinary mileage costs indicate that the cost of acquiring property necessary for the Three-State Highway was approximately $15,000 per mile through rural areas, $29,000 per mile in suburban territory, and $67,000 per mile in urban places.

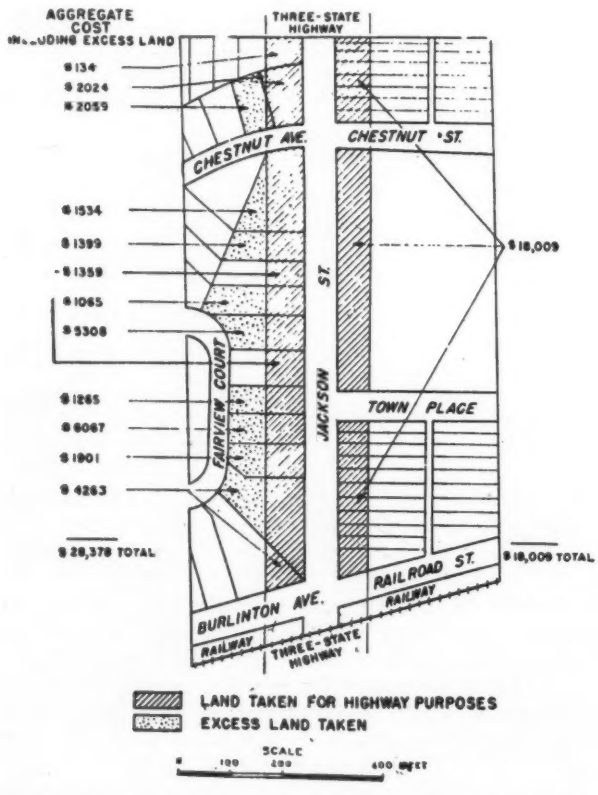
Costs of "bare" land.—The purchase of 718 acres of "bare" agricultural land entailed an expenditure of

$90,763, or $126 per acre. A frequency distribution of unit land costs shows that the average land cost was $145 per acre for all farm lands, $774 per acre for residential lands in rural areas, and $2,033 per acre for residential lands in urban areas.

Damages and incidental fees.—Damage costs averaged $11,801 per mile of highway. Out-of-pocket incidental fees averaged $330 per mile of road.

Damages for legal injuries may be divided into various categories. The principal classifications in highway land acquisition are improvement or betterment damages and consequential damages. Improvement or betterment damages are amounts of money paid for direct damage to structures, trees, fences, lawns, crops, etc., resulting from the acquisition of property. Consequential damages are amounts of money paid a property owner for injury to the remainder of his land as a result of decrease in site value, deprivation of lateral support, grade change, loss of access, severance, etc., caused by a highway development. There is a third category of damages for which no compensation need be made because, in general, the law does not recognize the validity of damage claims for noise, inconvenience, inesthetic arrangements, and the like. This type of damage is called damnum abseque injuria.

Marginal land acquisition.—Forty-two parcels of marginal or so-called "excess" land, aggregating 25.6 acres, were purchased at an estimated total cost of $30,823. The parcels are largely in Du Page County, Ill. Of this land, 14.7 acres were traded for other lands needed for highway purposes, 0.6 of an acre was sold, 2.7 acres were transferred to other governmental agencies, and 7.6 acres still remain in county ownership. Some surplus land was purchased in order to avoid the payment of large amounts of consequential damage because of severance and destruction of plottage values. In general, the device of marginal land acquisition was used quite successfully in Du Page County.



Location of excess land acquired on 1,000 feet of highway in the village of Clarendon Hills, Du Page County.

Highway widening versus highway relocation.—Analysis of costs on several widened or relocated sections of the highway indicates that land acquisition costs for widening are considerably greater than for relocation.

Suggestions for Improving the Situation

The Public Roads Adiministration has just published a pamphlet, prepared by Mr. Levin, suggesting revisions of the existing mechanism to produce a policy that will facilitate land assembly at minimum total cost with the maximum of speed consistent with the preservation of the rights of private property. The desirability of such revision is evident when it is known what diversity of land acquisition methods, most of them time-consuming and expensive, are found in use in the various states and other jurisdictions. There are, says Mr. Levin, 320 methods of condemnation in 55 jurisdictions—46 in Pennsylvania, 15 in Nebraska, 13 in Missouri.

His recommendations for remedying this condition are as follows:

(1) A single, efficient method, preferably what has been referred to as the administrative type, of acquiring lands for highway facilities or for all public purposes can effectively be substituted for the many cumbersome procedures now in use. There is nothing inherent in the nature of the units exercising the power of eminent domain or in the public uses for which lands are acquired that requires individual treatment.

(2) To make possible the successful transformation of a projected public improvement into the finished product, it is suggested that the right of entry to make locations and surveys be written into the State statutes.

(3) After certain preliminaries have been complied with, and pending the settlement of negotiations, the right of immediate entry and possession of lands is necessary to expedite the timely construction of highways and should be granted by law, with adequate safeguards for the protection of the property owner.

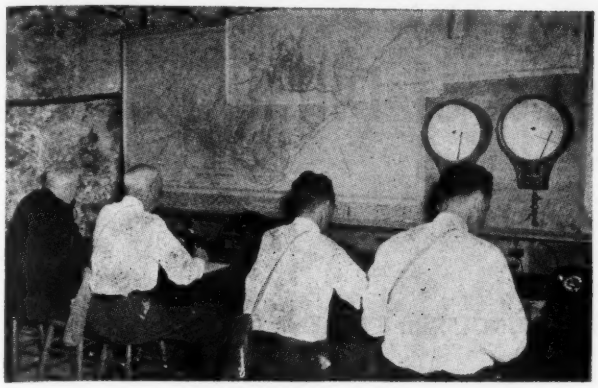
(4) A centralized land-acquisition division should be created in every State highway department, equipped with adequate records and staffed with trained personnel selected by the merit system. A consistent policy should prevail, utilizing prenegotiation appraisals, options, standard values, research, summary court procedure, and all the other techniques which experience has demonstrated result in greater returns per unit of expenditure.

(5) The magnitude of the present expenditures and the time consumed in title searching and title examination in the transfer of property acquired for highway facilities (as well as for other public purposes) warrant a careful consideration of the merits of the effective and widespread adoption of the Torrens system of land registration in the various States.

(6) Since the judicial condemnation mechanism used in most of the States today is cumbersome and costly, revision of forcible acquisition should be modeled after the summary and effective administrative Court-of-Claims procedure utilized under the New York Grade Crossing Elimination Act. A single condemnation tribunal is most desirable.

(7) Present land acquisition laws should be revised to the end that all court acquisition proceedings be given a genuine preference over all other civil actions in the setting of times for hearing and trial, so that

(Continued on page 30)



Subterranean control center, Honolulu Water Department; showing maps, pressure gauges and telephone battery.

Wartime Precautions of Honolulu Water Works

Begun eighteen years ago, speeded up in 1939. Present organization for wartime conditions. Subterranean office and shelter.

THE officials of the waterworks of one American city do not need to be reminded at intervals of the necessity for wartime precautions. The Honolulu water board has experienced bombing; but even on December 7, 1941, they were not caught unprepared. In fact, precautions for the protection of the waterworks were begun 18 years ago, the first being the decentralization of the main pumping stations and their operation by steam, making them independent of centralized electrical energy. There are three main steam pumping stations, and two underground ones operated by electricity. Heavy reinforced concrete has been used in constructing all the stations. Early in 1941, wire fences were placed around each of the three surface stations; and immediately after Dec. 7, temporary sandbag protections were installed at the entrances to them. Later, permanent brick walls were constructed by employees at all five stations as a part of a splinter-proof project.

Active preparation for war began nearly two years before the Pearl Harbor attack, when levels in an open reservoir, which does not supply water for domestic use but is maintained as a flood control unit and as a possible source of artesian infiltration, was dropped to about 35% capacity and maintained there.

Then came December 7th. Fortunately only four breaks in water pipe were caused, directly or indirectly, by the bombing. Two were breaks in 6″ mains, caused by water hammer due to too rapid closing of fire hydrants after direct hits on two school buildings. The other two were breaks in two service lines caused by bombs or anti-aircraft shells.

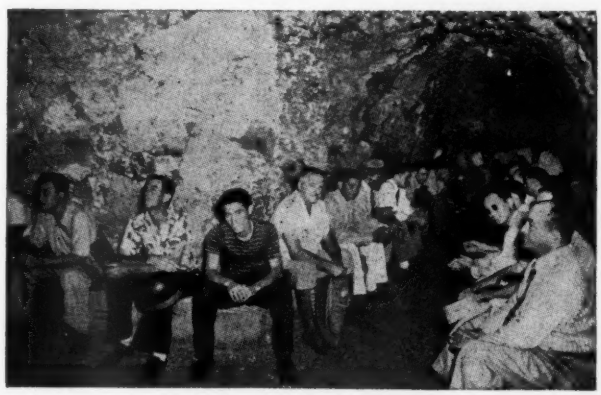
Then came organization for wartime conditions. The first probelms dealt with were blackout and dispersion of vehicular equipment; followed immediately by splinter, blast and bomb protection. Pumping station personnel shifts were rearranged and all employees trained in protective activities. Special attention was devoted to training in valve control, a large part of the male personnel being so trained to act as emergency reserves for maintenance crews. Employees were immunized against typhoid and smallpox. Employee assemblies are held frequently and instruction and training given in first aid, incendiary bomb control, gas attack defense and decontamination, nutrition and allied subjects.

The Board of Water Supply is on semi-alert at all times. Dormitory provisions have made it possible for at least one executive to be on night duty at headquarters ready to put the underground control center into operation. This center, built at a cost of $15,000, serves also as a bomb shelter for the protection of employees during the morning and evening hours, when it is necessary for them to assemble at the Board of Water Supply Building. It consists of ten connecting tunnels under a cover of about 25 ft. of solid rock. Smaller underground storage chambers were drilled adjacent to outlying waterworks installations for the storage of maps, records and vital equipment.

Lining Roadside Shoulders in Texas

It has been a more or less general practice in Texas to protect the shoulders and ditch slopes of roads from erosion by planting Bermuda grass. One disadvantage of this is that it takes a year for this grass to form a protective sod, and it interferes with the free flow of water and intercepts silt and debris. Instead, soil-cement is being used in a number of cases. In work done in District 10, according to I. H. Crutcher, Jr., district maintenance engineer, the slopes were first prepared by cutting them 4″ lower than the finished grade of the desired section, and bringing them up to grade with soil-cement, which was mixed in a pug mill of 14 cu. ft. capacity, equipped with a skip. The soil used was a fine sand, which was shoveled into the skip and measured by leveling to a mark. Then 2 bags of cement per cubic yard (7.4% by volume) was added. The material was mixed and spread 4″ deep with hoes. Initial finish was obtained with wooden floats and final finish with trowels. Near intersections and at driveways, where the soil-cement would be subjected to traffic, the thickness was increased to 6 in., and the cement content was raised to 11 per cent by volume (3 bags per cu. yd.).

The cost of the finished soil-cement in place, 4 in. thick, has averaged 45 cents per sq. yd.



Subterranean bomb shelter, Honolulu Board of Water Supply. Showing, in one of ten compartments, part of the 400 ft. of tunnel, which includes two escape tunnels and a gas chamber.

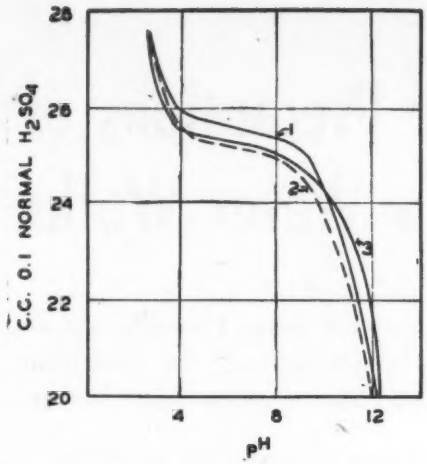


Fig. 1—Neutralization power of different calcium hydrates.

Effect of Dilution on Sludge Fo

By WILLEM RUDOLFS and WILLEM RUDOLFS, JR.

TREATMENT and effective disposal of acid wastes produced by chemical industries are frequently required to avoid sewer corrosion, prevent interference with biological sewage treatment processes, and stream deterioration. Selection of the method of treatment and disposal of treated wastes is influenced primarily by the volumes of wastes produced and the cost of treatment. In addition, wastes requiring neutralization of mineral acidity before discharge into sewer or stream present other problems, two of which are discussed. They are: (1) Type of alkali best suited and lowest in cost for neutralization, and (2) The quantities and disposal of the sludge produced.

It has been stated previously that the method of neutralization to be used depends upon the type of acid, volume of waste, other ingredients in the wastes, and purpose to be served by the treatment.[1]

During laboratory studies made on a specific acid waste containing primarily sulfuric and hydrochloric acids, particular attention was paid to the question of sludge production in an effort to avoid secondary handling and possible difficulties. At the same time different types of alkalies were used for neutralization. It had been found previously in the treatment of acid nitrocellulose wastes, containing mixtures of sulfuric, nitric and hydrochloric acids with some solvents and a very small amount of nitrocellulose floc, that combinations of lime and soda ash produced the smallest amounts of sludge.[1]

Material and Methods

The acid waste used for experimentation was collected over a number of days and on analyses was found to vary from 14 to 21.6 per cent acids expressed as 100% sulfuric acid. The method of experimentation consisted in general in neutralizing the wastes with different alkalies, employing various dilutions. The procedure followed was to take samples of acid wastes, dilute to the predetermined extent, and add the neutralizing agent followed by constant agitation for a definite time; duplicating as closely as possible in the laboratory the methods necessary in large-scale operation. The pH values were determined after each addition of alkali, sludge formation recorded and foam formation noted. The acidity of the samples was determined by titration with 0.1 normal sodium hydroxide, using phenolphthalein as indicator.

Neutralization Power of Different Calcium Hydrates. The CaO content of hydrated lime is not the only factor affecting neutralization of acidic compounds. Various properties, particularly structure of particles and solubility, are of importance.[2] The solubility of lime has a relation to the rate and degree of neutralization.[3]

Preliminary investigations were made to determine the comparative neutralization power of different brands of high-calcium hydrate under specific conditions. The procedure was titration of one-gram samples with 0.1 normal sulfuric acid at a dilution of 1:8, using vigorous agitation to keep the lime particles in suspension until complete solution. Typical results obtained are illustrated in Fig. 1. The greatest difference in neutralizing power, found at pH 4.0 and 7.0, was 1.6 per cent. This is probably within the limits of practical application. Factors such as speed of stirring, length of time elapsed for equilibrium and variation in temperature affect the neutralization power, so that the commercial brands of high calcium hydrate used may be considered as about equal in effect.

Speed of Reaction of Neutralizing Agents. The time required for complete neutralization by the different neutralization agents employed varied materially. This is of importance in connection with the size of the mixing tanks required and affects the power required for stirring.

Under practical conditions, where the waste is to be discharged into a stream, neutralization of the mineral acid is of greatest importance. Raising the pH value of the acid waste to 4.2 takes care of mineral acidity, leaving carbon dioxide acidity to be reduced by aeration and reaction in the stream. When the wastes are discharged into municipal sewers, raising the pH value to 7.0 is considered good practice, to avoid sewer corrosion and possible interference with biological treatment processes. The time required for neutralization of the mineral acid is of more importance than the total time for complete neutralization. After a pH of 4.2 has been reached, the additional time required to obtain a pH of 7.0 is about the same for all neutralization agents used.

The time required to obtain a pH value of 4.2 was as follows:

Neutralizing Agent	*Time in Minutes*
High calcium hydrate	20
Calcium limestone	45
Dolomitic hydrate	15
Soda ash	5

The calcium and dolomitic hydrates and pulverized limestone were commercial brands recommended and

Formed By Neutralizing Acid Wastes With Lime

Results from experiments conducted to learn the type of alkali best suited for neutralization, the quantities of sludge produced and the effect of dilution of the waste.

used for neutralization. It is seen that the dolomitic hydrate proved to be best for the purpose, considering time alone, followed by calcium hydrate and pulverized limestone.

Effect of Dilution

The effect of dilution of the acid with calcium hydrate is illustrated in Fig. 3. As might be expected, the quantities of calcium hydrate required for neutralization of the mineral acid or to reach a pH value of 4.2, was constant, using dilutions varying from 4:1 to 64:1. Variation in dilution within limits and using limestone (Fig. 4) or dolomitic hydrate (Fig. 5) also did not affect the weight of neutralizing agent required. The same was the case with definite mixtures of dolomitic hydrate and soda ash. However, when the relation between dolomitic hydrate and soda ash was varied, the quantities of neutralizing agent required also varied. This is illustrated for a given dilution in Fig. 5. The smaller the quantity of soda ash used in the mixture, the less alkali was required to reach a given pH value.

Table I

Quantities of Neutralizing Agent required to Raise the pH Values to 4.0, per one liter of Waste Containing 16% H_2SO_4 and 14% HCl

Neutralizing Agent	*Dilution*	*Grams Required*
Calcium hydrate	4:1	193
	8:1	193
	32:1	193
	64:1	191
Calcium limestone	8:1	350
	32:1	350
	64.1	350
Dolomitic hydrate	32:1	158
	40:1	158
	50:1	158
	64:1	157
75% dol. hydrate + 25% soda ash	32:1	180
50% dol. hydrate + 50% soda ash	32:1	210
25% dol. hydrate + 75% soda ash	32:1	222
Soda ash	50:1	180

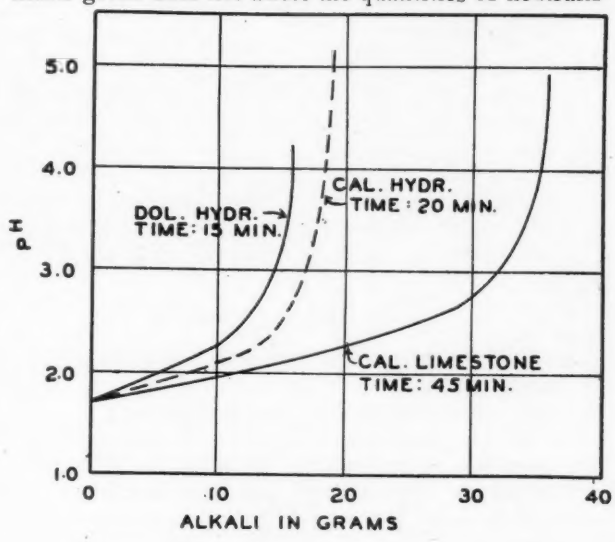
Table II

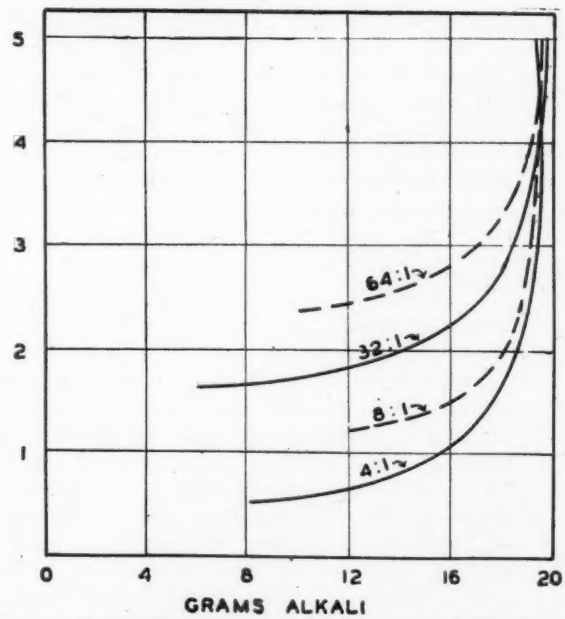
Weight and Cost of Neutralizing Agent for Each Per Cent of Acid Per 1000 Gals. of Waste

Neutralizing Agent	*Cents*	*Lbs.*
Calcium hydrate	38.7	72.37
Calcium limestone	40.9	111.25
Dolomitic hydrate	36.2	59.25
75% dol. hydrate + 25% soda ash	49.9	67.5
50% dol. hydrate + 50% soda ash	64.8	78.75
25% dol. hydrate + 75% soda ash	70.9	82.5
Soda ash	49.9	67.5

NOTE: Calcium hydrate @ $10.50/ton, dolomitic hydrate @ $12.00/ton, calcium limestone @ $6.10/ton, and soda ash (bulk) @ $19.20/ton.

The quantities of neutralizing agent required to raise the pH values to 4.2 with varying dilutions are shown in Table I. Dilution of the waste within the limits given does not affect the quantities of neutraliz-





Top—Fig. 2—Comparative neutralization power of different alkalies.

Bottom—Fig. 3—Neutralization of various dilutions with calcium hydrate.

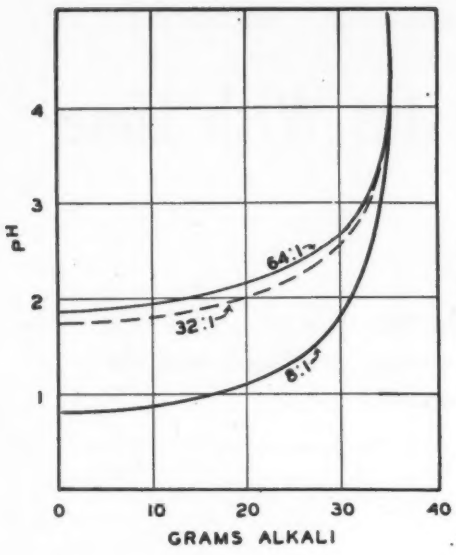


Fig. 4—Neutralization at various dilutions with limestone.

ing agents needed. The greatest weight of material required with this waste was calcium limestone and the smallest dolomitic hydrate.

The weight of neutralizing agent for each per cent of acid present in the waste and the relative cost of chemicals for treatment is illustrated in Table II. The lowest weight required and the lowest cost for chemicals was with dolomitic hydrate. The cost figures are based upon quoted market prices delivered at the plant. There is shown to be a direct relationship between the weight of mixtures of dolomitic hydrate and soda ash, and the cost for chemicals (Fig. 6).

Sludge Formation

Neutralization of relatively concentrated acid produces considerable quantities of sludge. The character and amount of sludge depended upon:

1. The neutralization agent; 2. The extent of dilution (or concentration) of acid, and 3. The pH to which the neutralization was extended. Each neutralization agent formed a different type of sludge. Limestone produced a granular, heavy precipitate, which settled rapidly and tended to conglomerate. Calcium hydrate produced a more flocculant precipitate, light but volumous. Dolomitic hydrate gave very finely-divided, microcrystalline particles. Calcium hydrate produced the most sludge; limestone less and dolomitic hydrate the least in respect to volume. At low dilutions, the ratio of volume of sludge was roughly:

Calcium hydrate	6
Limestone	5
Dolomitic hydrate	4

With increasing dilutions, the volume of sludge produced decreases, because some of the calcium sulfate dissolves. However, the reduction in volume of sludge is not proportional to the dilution; the volume of sludge decreases much more rapidly than the dilution. At higher dilutions, most of the sludge remains in supersaturated solution for some time and then precapitates in fine, easily-suspendable particles. At low dilutions, the calcium sulfate precipitates immediately in large conglomerated masses which settle rapidly and are very difficult to dissolve, even if the suspension is diluted to a great extent. The dilution required to bring the sludge formed into solution varied with the type of neutralizing agent used, as indicated by the following figures:

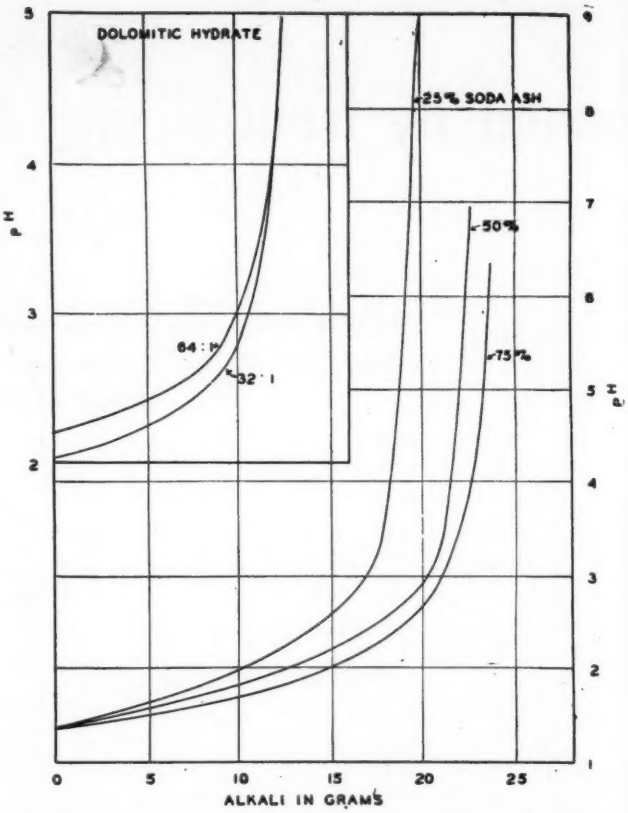


Fig. 5—Neutralization with dolomitic hydrate alone, and with mixtures of dolomitic hydrate and soda ash at given dilutions.

Alkali Used	*Dilution for Complete Solubility*
Calcium hydrate	120:1
Calcium limestone	250:1
Dolomitic hydrate	67:1
75% Dolomitic hydrate + 25% Soda Ash	55:1

Hence the volume of sludge produced at a given dilution is not the same with all neutralizing agents used. The allowable acid concentration in the waste examined, to prevent practically all sludge formation when the mineral acidity was destroyed, amounted to 0.35% if dolomitic hydrate was used and to 0.45% if a mixture of 75% dolomitic hydrate and 25% of soda ash was used. Much lower percentages were allowable with calcium hydrate and calcium limestone. If the neutralized material was left standing for several

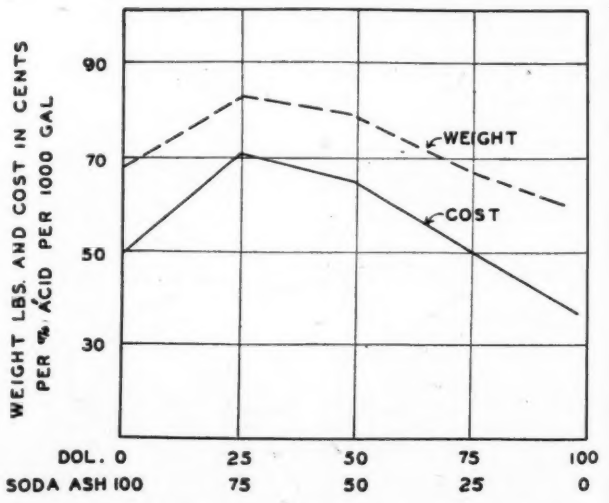
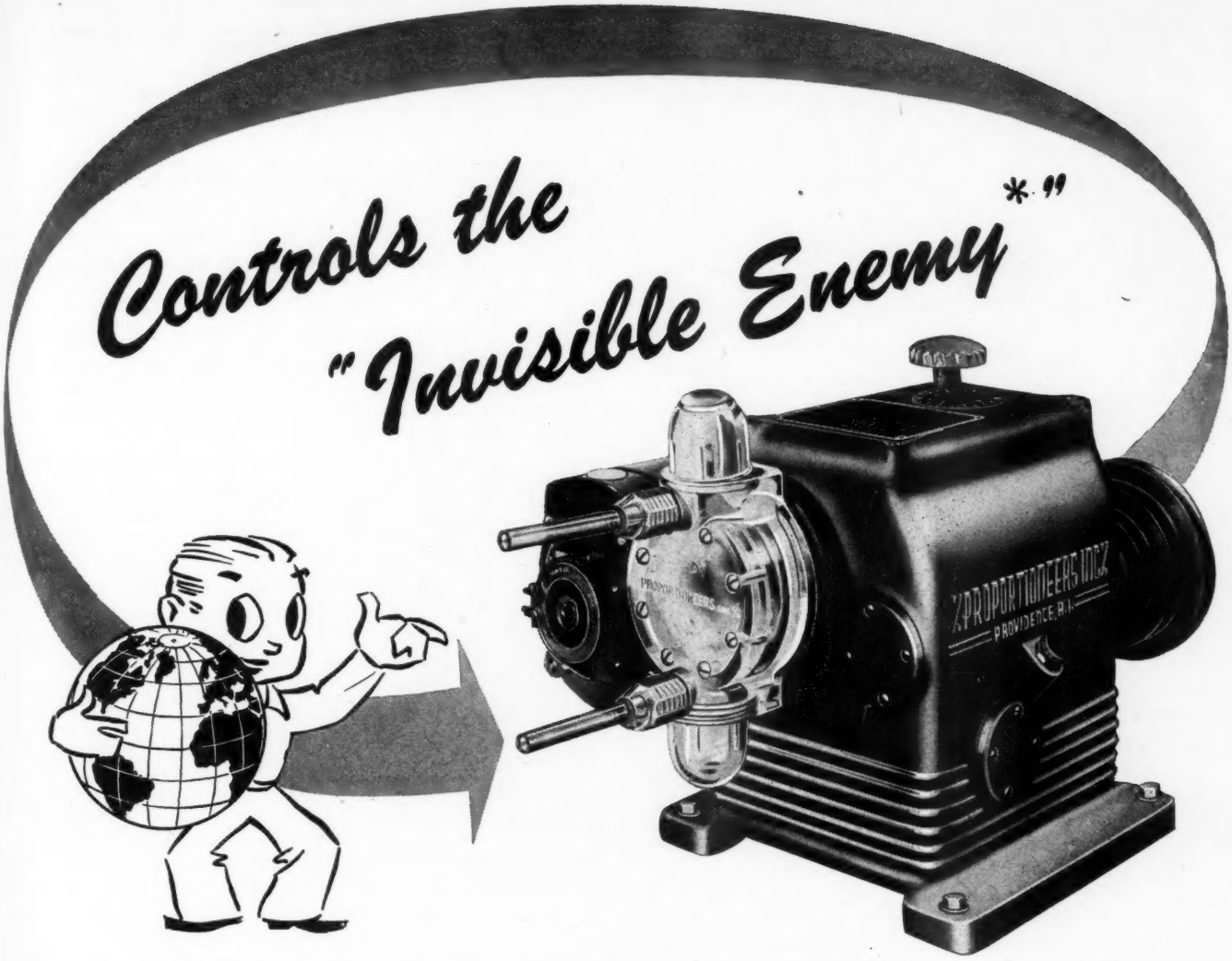


Fig. 6—Relation between weight of neutralizing agent and cost.



% PROPORTIONEERS, INC. %

WATER STERILIZATION EQUIPMENT PROTECTS OUR ARMED FORCES AND CIVILIANS ALL OVER THE WORLD

* Water borne diseases such as typhoid and dysentery are the Invisible Enemy whose terrible forces are as deadly as bombs and shells. Naples, Italy, is undergoing the tragic consequences of inadequate sanitary facilities with recent outbreaks of typhus. One of the most important weapons in our fight for adequate sanitation is sterilization and treatment of drinking water. Typhoid in Italy, India or Guadalcanal is no more deadly than on the "Home Front". % Proportioneers, Inc. %, while rushing the supply of Chlor-O-Feeders and Chem-O-Feeders to vital war fronts, stands ready to serve you at home in this never-ending fight against the invisible enemy.

Send for Bulletin San-1

% PROPORTIONEERS, INC. %

"Chemical Feeder Headquarters"

96 CODDING ST., PROVIDENCE, R. I.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

days, a gradual growth of crystals took place, resulting in some sediment.

The sludge produced is due to the calcium, magnesium, and sodium sulfates formed. Sulfate formation takes place as soon as neutralization starts, but mass crystallization begins only when the mineral acid is practically destroyed. Between pH values of 4.2 and 4.7 microcrystals appear to be formed which may make the solution opaque, but the crystals do not conglomerate or settle except after greatly prolonged standing. When the pH values are raised to 4.8-5.0 the color of the solution changes and it appears that some physical or chemical interaction takes place which causes the sludge to precipitate. The sludge particles grow rapidly and settle readily. The density and crystalline form of the sludge depends upon the neutralization agent used.

Foam Formation

The formation of foam produced by neutralization is objectionable when the neutralized effluent is discharged directly into a stream, particularly if the foam is tenaceous, forming "islands" on the surface of the stream which may be carried a considerable distance. The objection is mostly from an esthetic standpoint, and calls the layman's attention to the "pollution."

Limestone neutralization produced some foam at high acid concentrations. Considerable foam was observed when dolomitic hydrate-soda ash mixtures were employed. However, the foam broke up readily when agitated and showed no tendency toward aggregation.

Summary and Conclusions

In the treatment of acid industrial wastes by neutralization, the type of alkali used and quantities of sludge produced are of importance in connection with operation, results accomplished, and cost. A study of strong acid waste, consisting primarily of mixtures of sulfuric and hydrochloric acid with some other ingredients but no suspended matter, led to the following conclusions:

1. The comparative neutralization power of several standard brands of high calcium hydrate was practically the same under standardized conditions.

2. The speed of reaction of the neutralizing agents employed (calcium hydrate, dolomitic hydrate, limestone and combinations of dolomitic hydrate and soda ash) varied considerably. The time of stirring and the speed of stirring also affected reaction speed.

3. Dilution of a given acid waste had no effect on the quantity of neutralizing agent required.

4. The weight of neutralizing agent needed varied with the type of agent used.

5. Neutralization of mineral acid with dolomitic hydrate could be accomplished with the smallest amount and at the lowest cost for chemicals.

6. Sludge formation and its character depended upon the neutralization agent, the extent of dilution and the pH to which neutralization was extended.

7. With increasing dilutions, the volume of sludge produced decreased more rapidly than the dilution increased. Hence, neutralization at high dilutions is advantageous.

8. With dolomitic hydrate, all sludge formation could be avoided when neutralization was extended to destruction of the sulfuric and hydrochloric acids (pH 4.2).

9. Foam formed could be easily dissipated and showed no tendency toward aggregation.

References

(1) W. Rudolfs, Acid Waste Treatment with Lime; *Industrial and Engineering Chemistry*, 38, 227, 1943.
(2) W. Rudolfs, Effect of Lime on Coagulation of Sewage; *Public Works*, 73, 11, 15, 1942.
(3) W. Rudolfs and Wm. A. Moggio, Hydrated Lime in Sewage Treatment; *Public Works*, 74, 1, 11, 1943.

The above, written for PUBLIC WORKS, is a Journal Series paper of the New Jersey Agricultural Experiment Station, Rutgers University, Dept. of Water and Sewage Research.

Building an Intercepting Sewer at St. Charles

(Continued from page 20)

The work at the outlet before the flood had carried the pipe under the railroad in a heavily shored tunnel in running sand, the pipe being laid in a heavy concrete cradle. Checking showed that it had not moved in line or grade.

The soil then changed abruptly to a clay and rock fill, but the sewer fortunately rested on the old river bottom which was chiefly blue clay and sand, making an ideal bedding for the pipe. As the fill was poor material for backfilling around the pipe, this was cushioned with sand where necessary to relieve excess pressure. No bracing or sheathing had been used until excavation began in the clay and rock which, although it had been placed by the railroad years ago, had never stabilized and began to cave from almost the first bite. Here also some piles and crossties of a railroad trestle, built at least 50 years ago and still in perfect condition, had to be cut out.

Bracing was continuous from Sta. 1 + 38 to Sta. 14 + 50, using approximately 55 M ft. B.M. of lumber, which was not withdrawn. Trench jacks were used for braces, but were replaced with 4" x 4" timber as the backfilling reached each jack.

This sewer line in places was within 12 ft. of the railroad, over which war material and troops were being hauled daily, but I am glad to say that, except that trains were slowed to 5 miles an hour when passing the job, nothing happened to impede the war effort. The railroad at all times had a guard stationed at the actual working site and co-operated in every way possible to expedite the work.

The Victory Construction Company, which was the contractor, is a partnership of Claude L. Kelly and David F. Manser. Mr. Manser was in charge of the work. Elias A. Neuman, civil engineer of the F.W.A., supervised and inspected for the U. S. Government; and the author, who originally designed and made up the drawings and specifications, represented the city of St. Charles. Sverdrup and Parcel, consulting engineers of St. Louis, made the preliminary survey of the site. We all feel we have completed a worth while project and freed the city of a very troublesome problem for some time to come.

Contractor Responsible for Subcontractor's Debt

The contractor constructing a sewage pumping station for a city executed a bond conditioned on the payment by the contractor for all labor and materials used in carrying out the contract. He thereafter sublet a part of the contract to a subcontractor. A materialman furnished lumber to the subcontractor which was not paid for. The Kentucky Court of Appeals held (288 Ky. 319, 156 S.W. 2d 170) that the materialman could maintain an action on the bond against the contractor and his surety.

BUILDERS OF WELL WATER SYSTEMS
FOR EVERY MUNICIPAL AND
INDUSTRIAL NEED

AS THE YEARS ROLL ON

There is a generous amount of thoroughly dependable reliability in every Layne Well Water System ever built! In the postwar years to come, that outstanding feature will be greatly appreciated by thousands of municipal and industrial executives. Even during the most strenuous days of war emergency, Layne quality was rigidly maintained.

There is more to a Layne Well Water System than reliability. In efficiency, they are beyond comparison. They lead the world in records of long life. Maintenance cost, year in and year out, is only a minor item.

Layne Well Water Systems are today serving the world's greatest cities, manufacturers, war plants, railroads, mines, naval stations, shipyards and training camps. In thousands of cases, both in this land and in foreign countries, they have met and far surpassed the most rigid requirements in quality, efficiency and low operation cost.

If your post war plans call for the use of more water, Layne engineers will gladly cooperate in providing valuable recommendations. For literature, address Layne & Bowler, Inc., General Offices, Memphis 8, Tennessee.

LAYNE *Affiliated Companies*

Layne-Arkansas Co., Stuttgart, Ark. * Layne-Atlantic Co., Norfolk, Va., Savannah, Ga., Orlando, Fla. * Layne-Central Co., Memphis, Tenn. * Layne-Northern Co., Mishawaka, Ind. * Layne-Louisiana Co., Lake Charles, La. * Louisiana Well Co., Monroe, La. * Layne-New York Co., New York City and Pittsburgh, Pa. * Layne-Northwest Co., Milwaukee, Wis. * Layne-Ohio Co., Columbus, Ohio * Layne-Texas Co., Houston and Dallas, Texas * Layne-Western Co., Kansas City, Mo., Chicago, Ill., and Omaha, Neb. * Layne-Western Co., of Minnesota, Minneapolis, Minn. * International Water Supply, Ltd., London, Ontario, Canada.

LAYNE

WELL WATER SYSTEMS

DEEP WELL PUMPS

When writing, we will appreciate your mentioning **PUBLIC WORKS**

Control of Well Construction in Wisconsin

The Wisconsin Legislature of 1935 recognized the importance of safe water as a factor in public health by enactment of Chapter 162, Wisconsin Statutes, known as the Pure Drinking Water Law. Pursuant to the provisions of this chapter, the State Board of Health adopted minimum standards for the location and construction of wells and the installation of pumping equipment, known as the Wisconsin Well Construction Code.

To guard against well driller activity that would be harmful to public health and welfare, the legislature provided preventive measures to be administered by the State Board of Health. These are: (1) cooperative, and (2) punitive. Cooperative measures consist of dissemination of essential information and supervisory assistance. Punitive measures involve suspension or revocation of permits or imposition of penalties.

Cooperative activities designed to acquaint every well driller with all regulatory requirements have to date consisted of illustrated discussions of regulatory requirements at numerous group meetings throughout the state, periodic bulletins relating to specific phases of well construction and pumping equipment installation, individual assistance based upon data contained in well construction reports (well logs), and personal supervision where necessary.

Well drillers are required to be registered with the State Board of Health, conform to minimum standards of well construction, submit water samples, and file logs of newly constructed or reconstructed wells. Citizens requiring the services of a well driller rightly assume that since a driller is registered with the State Board of Health, and required to conform to definite minimum standards, there is reasonable assurance that construction of a well will result in a permanently safe water supply.

Being charged with the duty of administering the Pure Drinking Water Law, the State Board of Health cannot permit abuse of this confidence and must, therefore, resort to revocation or suspension of permits or to the punitive measures provided in the law for failure to conform to the provisions of the rules and regulations.

Well drillers generally have recognized the gravity of their responsibilities and there has been notable improvement in the safety of private water supplies since 1935. This improvement, however, is by no means comparable to the possibilities. Well drillers, after all, are human and there are those who have not recognized their responsibilities, and have not contributed their share in accordance with the duties imposed upon them.—From the *Wisconsin State Board of Health Quarterly Bulletin* for October-December, 1943.

Surplus Water Revenue Rebated to Customers

The Board of Water Commissioners of Elizabeth, N. J., have, for several years past, found their income from water rates greater than necessary to meet their expenses, reserve funds, etc. Some cities, finding themselves in this enviable condition, have reduced their rates. Elizabeth, however, realizing that, if they should do this and the income should fall off in a few years or expenses increase, they would not find it easy or pleasant to increase the rates, have employed the alternative of rebating the surplus to the customers. This they do by deducting from the bills sent to the customers each year, amounts proportional to the amounts of water used by them the previous year.

The year 1943 was an unusually favorable one, with more water being used than ever before, and the surplus to be divided is about $90,000. One quarter's bill in 1944, therefore, will be reduced by deducting from it 20 cts per thousand cu. ft. of water used during 1943. This policy was started in 1938, but previous to this year the deduction was 10 cts per thousand.

Gaffney, S. C., population 7,600 employs a somewhat different method. In December it sends to all consumers, as a Christmas present, a notice that their bills for water and electricity (the Board of Public Works operates both utilities) for December will be sent them in January marked "Paid." This it has done for 12 consecutive years.

Highway Land Acquisition Costs and Practices

(Continued from page 22)

all such actions may be heard and determined quickly. At the same time, means could be devised to make such a preference effective in practice.

(8) In the interest of economy and dispatch, group condemnation should be sanctioned by law and used effectively in the acquisition of lands for highway facilities. Moreover, it is essential to the public interest that when the need arises, the condemner of lands be permitted to abandon condemnation proceedings except when a property is deemed already to have been taken.

(9) It is desirable to sanction friendly, noncontested, summary court proceedings in unusual cases and to cure defective titles to property which is acquired for public purposes.

(10) All States should permit special benefits to property arising from public improvements to be offset at least against consequential damages. While some State statutes permit special benefits to be so offset, in actual practice it is rare that benefits of any kind are taken into account in the determination of just compensation. The sound public policy which is thus written into the law ought to be reflected in its application in practice.

(11) Since the obvious financial incapacity of local units and of some States is becoming more and more of an obstacle in the provision of adequate highway facilities, the States and the Federal Government may find it necessary to finance acquisition of land for projects in which they participate.

(12) The device of marginal land acquisition, popularly identified as "excess condemnation" should be legally sanctioned in all the States; it is used but sparingly in those jurisdictions in which it is permitted, despite its potential usefulness.

(13) Where devices such as marginal land acquisition are not utilized, land use controls, i. e., zoning and platting and subdivision regulation, will be useful in producing a more efficient highway transportation system.

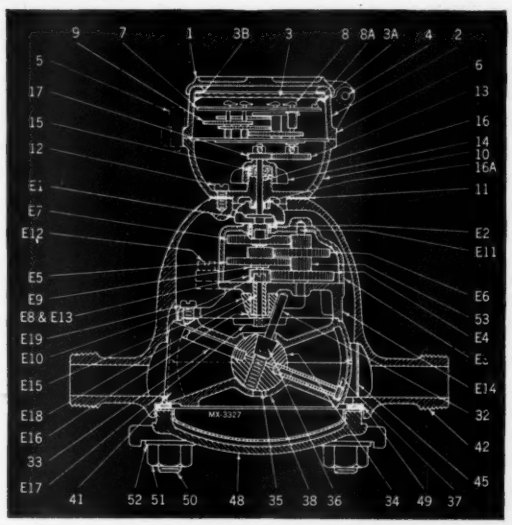
(14) Despite the apparent usefulness of the limited-access highway, its potentialities are still largely unexplored. Early and wide-spread utilization of this type of motorway in areas of high traffic density will pay untold dividends in safer and more efficient travel.

The proposals stated briefly above are developed item by item in the 32-page pamphlet "Public Land Acquisition for Highway Purposes," copies of which can be obtained for 10 cts. from the Superintendent of Documents, Government Printing Office, Washington, D. C.

L-154 Hasn't Reached Inside ...So Now's A GOOD TIME TO ORDER NEW METERS OR NEW PARTS FOR PRE-WAR METERS

WATCH DOG WATER METERS

Check the specifications in the accompanying chart and list to remind yourself of the "Watch Dog's" accuracy-engineered make-up and to make notes of needed parts which are interchangeable with your present Worthington-Gamon Meters.



LIST OF PARTS

No.	Name of Parts	No. of Pieces
1	Register Box Cover	1
2	Register Box Ring	1
3	Register Box Glass	1
3A	Glass Ring	1
3B	Glass Gasket	1
4	Register Box Pin	1
5	Register Box Screws	2
6	Register Box Complete R.R. or S.R.	1
7	Register Dial	1
8	*Register Dial Hands	6
8A	Register Dial Screws	2
9	Register Complete, round rdg. or straight rdg.	1
10	Register Cup	1
11	Register Cup Gasket	1
12	Register Cup Screws	3
13	Register Change Gear	1
14	Stuffing Box Nut	1
15	Stuffing Box Packing	1 Set
16	Stuf. Box Spindle Compl.	1
16A	Stuf. Box Spindle Thrust Bushing	1
17	Stuf. Box Spindle Change Gear	1
18	Gear Train Lower Bracket	1
19	Gear Train Upper Bracket	1
20	Gear Train Driving Spindle	1
21	Gear Train Spindle No. 1 (27 Teeth)	1
22	Gear Train Spindle No. 2 (36 Teeth)	1
23	Gear Train Spindle No. 3 (36 Teeth)	1
24	Gear Train No. 42 Gear	1
25	Lower Bracket Center Bushing	1
25A	Upper Bracket Center Bushing	1
25B	No. 3 Spindle Upper Bushing	1
25C	No. 1, 2, 3 Spindle Bushings	5
26	Gear Train Cap Screw	1
27	Gear Train Bracket Screws	2
28	Gear Train Clamp Screws	3
29	Gear Train Control Block	1
30	Control Block Cap	1
31	Gear Train Driving Arm	1
32	Disc Spindle	1
33	Disc Plate	1
34	Disc Ball (Upper)	1
35	Disc Ball (Lower)	1
36	Disc Complete	1
37	Disc Thrust Roller	1
38	Disc Chamber	1
41	Disc Chamber Diaphragm	1
42	Main Casing	1
45	Main Casing Strainer	1
48	Bottom Cap with Lining	1
49	Bottom Cap Gasket	1
50	†Bottom Cap Bolt	4
51	†Bottom Cap Bolt Nut	4
52	†Bottom Cap Bolt Washer	4
53	Gear Train Complete	1

*For ¾" and 1" sizes, use 7

†For 1" size, use 6

WG 4-1

WORTHINGTON-GAMON METER COMPANY

282-296 SOUTH STREET, NEWARK, NEW JERSEY

Subsidiary of WORTHINGTON PUMP AND MACHINERY CORPORATION

Power Plant Equipment
Turbines & Turbo-Generator Sets
Diesel & Gas Engines
Pumps and Compressors
Air Conditioning & Refrigerating Equipment
Construction & Mining Machinery
Power Transmission Equipment
Liquid Meters

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Flight Strips for Post-War Service

Cheap substitute for airports for the 6,000 small communities that will want such service. Army air forces planning 70 or more.

There seem to be the best of reasons for believing that the use of airplanes after the war will be developed at a rate and to an extent reminiscent of that of the automobile forty years ago. This will mean that every community will need some sort of landing field. (We cannot yet envisage a helicopter landing stage on the roof of every house.) Most of these must be modest in area and cost, and the flight strip is suggested by Baker Engineers as meeting this requirement. The following is quoted from the October issue of their house organ "The Municipal News Letter."

"Recently, the Pennsylvania State Aeronautical Commission asserted that 70 new airports are needed to give adequate commercial air facilities to Pennsylvania communities and urged them to begin making construction plans now. The proposed 70 new airports are part of the Commission's 'Air Development plan,' which Commerce Secretary Floyd Chalfant characterized as 'a practical blueprint for the stimulation of aviation in the state now and after the war.' Of the total proposed projects, 49 are indicated 'to provide minimum commercial services' for cities and boroughs not now served by any public airport, and 21 for municipalities now served by inadequate airports which cannot be extended.

"Perhaps the answer to Pennsylvania's need would be the rapidly developing 'flight strip' program. By means of flight strips, landing areas may be provided at many places where the cost of an airport would not be justified in terms of money, materials, and transportation. The part that the flight strips are expected to play in the post-war plan of transportation may be summarized as follows:

1. Provide landing facilities for the civilian flier.
2. Provide basic landing facilities for small cities or groups of towns for air feeder and air cargo service.
3. Provide auxiliary landing facilities for all types of aircraft.

"A flight strip is defined as an area of land with clear approaches, located adjacent to a public highway, for use in peace time as landing areas for commercial and private airplanes in regions where the cost of a more complete field would not be justified. Although a flight strip provides only one runway, this is carefully located in the prevailing wind direction, which experience shows will make the field available for safe operation during the greater part of the year.

"Colonel Stedman Hanks was the first to promote the use of flight strips in 1931, but authorization for the actual construction of such strips by the Public Roads Administration of the Federal Works Agency was not given until the passage of the Defense Highway Act of 1941. Altogether, two appropriations of five million dollars each have been made. While a flight strip serves the same purpose for take-offs and landings as an airport, it does not have the various facilities found at an airport, such as terminal buildings, hangars, shops, gasoline storage, and lighting systems. Therefore, the cost of a flight strip represents only a part of the cost of an airport.

The general specifications covering flight strip design require that the strip shall be as near 8000 feet long as is feasible and that the width shall not be less than 500 feet nor more than 1000 feet, with a width of 800 feet as desirable. With this strip a paved runway 150 feet wide by 4000 feet long is to be used. The paved runway length is also extended at each end for a distance of 1000 feet and a width of 150 feet by stabilized soil surface. The purpose of these extensions is to provide additional runway at a low cost for those planes that require it.

"Wind and weather information ranks first in importance among flight strip design considerations, while next on the list are soil and topographic features. A study has to be made of fog and smoke conditions affecting visibility in the section, and wind records must be recorded on 'wind rose' charts. The principal construction operations are clearing, grubbing, grading, drainage, and paving, with grading and paving being the most important and expensive, as well as the most time-consuming. Great care must be taken in the surfacing operations. Although concrete has been used, flexible type surfaces, such as a plant-mixed bituminous one, are the rule. Careful selection of a site helps to reduce many of the problems such as drainage, and allows for rapid construction. The first strip made of concrete was completed in a mere 57 days.

"Although, for the present, flight strips are primarily for military use, they will undoubtedly play an important part in post-war civilian use. Pennsylvanians will do well to study the development of these inexpensive and conveniently-placed air accommodations."

The present airport system of the United States includes 1213 Class I airports—those having landing areas 1800 to 2500 ft. long; 905 Class II ports—having paved runways 2500 to 3500 ft. long; and 865 Class III—having paved runways 3500 ft. long and upward. Most of the Class II ports are near the smaller cities and larger towns, and Charles I. Stanton, Administrator of Civil Aeronautics, believes that we shall have to have many more of this class for future commercial flying of the shorthaul, feeder line type. Said Mr. Stanton: "It is reasonable to presume that communities of a thousand or more people will desire access by airplane. In the United States there are 6,669 communities with a population of 1,000 or more. Disregarding those which are close together and can use an airport jointly, and considering that larger cities will need several airports, a national total of 6,000 airports is a reasonable target to shoot at in the early postwar years." (There are now about 3,000.)

In addition to ports for the present type of planes, some cities are planning to provide landing fields for vertically rising planes located inside the city, convenient of access. The city planning commission of Wichita, Kans., on November 11th approved for future construction a fifteen-acre helicopter landing field near the business district and a combination air and bus terminal in the heart of the city.

The report of the Federal Works Agency for the fiscal year ended June 30, 1943 (made public in January, 1944) gives the following information about flight strips.

"The flight strips are auxiliary landing areas in strategic locations and are designed as dispersal areas for military aircraft; staging points for long flights involving supplies, equipment and troops; interceptor bases to ward off possible enemy bomber attacks, and operational points for the coastal patrol. These mili-

tary considerations governed the selection of general locations but, wherever possible, the flight strips were so located as to be of greatest future use to air transport and private flying activities.

"The field work of making surveys and supervising construction was carried on with the assistance of State highway departments, which cooperated in much the same manner as on Federal-aid road construction. At the request of the Army Air Forces, sites were selected and surveys and plans made for a group of flight strips along the Alaska Highway.

"It is anticipated that all projects will have been completed by the close of this construction season. As soon as a flight strip is completed a custodian is appointed and the State highway department is requested to perform any post-construction work that may be necessary, for which it is reimbursed by the Public Roads Administration.

"The completed flight strips* are being put to the various military uses for which they were intended, and in addition they are proving highly useful for emergency landings. The number of emergency landings already made has more than justified their construction. The usefulness of flight strips from the standpoint of aeronautical requirements has been demonstrated. Their economy in meeting certain operational requirements where complete airports are not essential is evident.

"In addition to the present program, the Army Air Forces requested that surveys, plans, specifications and estimates be prepared for more than 50 additional flight strips. These are in process of preparation and will be completed in the near future."

* Elsewhere the report refers to "a score of flight strips" as being in service. Locations are not named for reasons of "national security."

Sewer Construction Claims for Extras

A contract for the construction of a sewer incorporated therein, by reference, blue prints referring to performed cradle construction. The specifications stated that work shown on the plans should be considered as properly described in the specifications. In an action to recover certain extra compensations under the contract, the Second Circuit Court of Appeals (Middle West Const. Inc. v. Metropolitan Dist. of Hartford, Conn., 133 F. 2d 468), affirming judgment of the Federal District Court for Connecticut awarding plaintiff contractor only part of the damages claimed, holds that a contractor in such circumstances was not entitled to extra compensation because of the necessity of using that type of construction on the theory that it was not called for by the contract.

The dispute was whether cradle work was an extra or was called for by the contract, and whether it delayed the work and caused some of the contractor's men to remain idle while the cradle was hardening. It was held that the blue print made it sufficiently clear that a cradle of the type thereon shown would have to be pre-formed, so that the contractor was not entitled to extra compensation because of having to use that type of construction. The contractor made no objection or claim for extra compensation at the time the act was performed.

Claim for compensation for winter work due to delays in the construction of the sewer were not allowed where the delays were not due to any deviation by the city from the terms of the contract, the contractor having made no mention of such claim in letters previously written claiming an extension of time.

FRINK
SNO-PLOWS

V-Type or One Way

For whatever your need there's a FRINK V-Type or Blade Sno-Plow, equipped with every device for fast clean plowing, plus many exclusive FRINK features.

Post yourself on the latest snow-plowing developments with the FRINK catalog. Write TODAY.

MAINTENANCE NOTE

To take care of an actual or impending breakdown or to maintain your snow plows in sound working condition, stamp, print or write on, or attach to, your written order for parts a signed CMP Regulation 5A and the Limitations Order L 192 Certifications. Copies of these may be obtained from your nearest War Production Board office, or will be gladly mailed you by us on request.

CARL H. FRINK, Mfr., CLAYTON, 1000 Isl., N. Y.
DAVENPORT-BESLER CORP., DAVENPORT, IOWA
FRINK SNO-PLOWS OF CAN. Ltd., TORONTO, ONT.

LOUIS XIV OF FRANCE SELECTS ROUTE FOR WORLD'S FIRST CAST IRON WATER MAIN.

280 YEARS OF CONTINUOUS SERVICE IN EUROPE

THE first recorded installation of cast iron pipe to carry water was made in 1664 by order of the King of France. Unless recently destroyed by bombing, it is still in service. Throughout Europe 200-year-old cast iron water mains were in service before the United States and Royal Air Force bombers began their destructive raids—and still may be.

So when you specify cast iron pipe for current or postwar construction, you know one thing for certain—it will serve for centuries, in its original location or elsewhere. If the line has to be relocated or abandoned or replaced by larger diameters, you also know that cast iron pipe can be taken up and re-laid, or salvaged for cash. You may also know that cast iron pipe costs far less to maintain than any other pipe used for water mains, as proved by an unbiased survey.

[Section of world's oldest cast iron water main still (at last reports) supplying the town and parks of Versailles, France, after 280 years of continuous service.]

CAST IRON PIPE

PRESIDENT MONROE SIGNING MESSAGE TO CONGRESS DECLARING THE MONROE DOCTRINE IN 1823.

123 YEARS OF CONTINUOUS SERVICE IN AMERICA

[Here is America's oldest cast iron water main, now in its 124th year of continuous service in the water distribution system of the city of Philadelphia.]

THE first cast iron water main installed in America was laid in 1821 in Philadelphia. It is still in service. Today, nearly a century-and-a-quarter later, the methods by which cast iron pipe is produced have undergone revolutionary changes. Metallurgical, laboratory and production controls have been developed. Extensive product and field research projects have been carried out by our Association, independently and in cooperation with Associations representing users of pipe. A recent and fundamental forward step is the new Law of Design for cast iron pipe in underground service, approved by the American Standards Association and sponsored by official organizations representing pipe users.

Thus, you can take it for granted that the cast iron pipe made today by our members, has not only *long life* as proved by generations of service the world over, but is more economical than ever.

CAST IRON

Cast Iron Pipe Research Association
Thomas F. Wolfe, Engineer, Peoples Gas Building, Chicago, Ill.

SERVES FOR CENTURIES

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Water Rates Chargeable by City to Its Suburbs

In a water rate case involving the rates which the public water utility owned by the City of Milwaukee should charge its consumers, the Wisconsin Supreme Court held, (Village of Fox Point v. Public Service Commission, 242 Wis. 97, 7 N. W. 2d 571) that, under the Wisconsin statute, which provides that the Public Service Commission shall classify the service of a utility taking into account "the quantity used, the time when used, and any other reasonable consideration," one of the most important considerations is the comparative costs of the services. In this case the underlying question therefore was whether the service rendered to certain suburbs, all in the same class, was shown to be different from the service rendered to the consumers within the city of Milwaukee.

The peak demands on the utility by the service to the villages differed in amount from that to the city consumers. There was also a difference in the distance the water had to travel to serve the villages as compared with the average distance within the city. There was also a difference in these respects between the various suburbs. But the commission gave these factors little weight in arriving at its classification. A large part of the cost of constructing the plant came from special assessments within Milwaukee known as "customer contributions." None of these exactions were paid by the suburbs. But the utility and the commission agreed to disregard this factor.

The suburban rate includes the cost of fire protection; the urban rate does not. Within the city the cost of fire protection is paid by the taxpayers through the city; not by the consumers, the utility's retail customers. Fire protection is an expensive service. The utility decided, as the court held it might properly do, to collect this expense from the villages by including a charge in the general rate.

The service to the suburb was wholesale; that rendered to the urban consumers was retail. The suburb itself is a utility, buying water for resale; it owns its own distribution system. This purchase of water for resale may under the statute be used as a proper factor to be used in classifying service. If the services are found to be different, a difference in the rates for each is immaterial so far as loopholes is concerned, apart from the question of reasonableness, not here involved. Nor does a difference in the rate of return to the utility by the two different rates affect the lawfulness of the rate charged one village where there is no question of unreasonableness. No right of a village is invaded by the utility waiving part of its return from its urban customers. When the classification is justified, the question of discrimination is confined to members of the class receiving a like service. The two services, urban and suburban, were in fact held to be dissimilar.

Proof of City's Liability for Broken Water Main

The evidence of the plaintiff in an action for damages caused by water from a broken water main constructed and controlled by the defendant city, even though sufficient under the ipsa loquitur doctrine to establish prima facie negligence of the city, was held not conclusive proof thereof. The burden of showing that the damage was due to the city's negligence, the New York Court of Appeals held (287 N.Y. 108, 38 N. E. 2d 455) rested on the plaintiff and did not shift to the city. A verdict cannot be directed for the plain-

The vicious land and sea fighter
—the amphibious

WATER BUFFALO

DESIGNED BY THE ENGINEERS OF PEERLESS PUMPS

America's newest fighting fortress has gone to War with a vengeance. It's the Water Buffalo. It swims through sea and surf, it crawls over beachheads, up over rocky terrain, trundles through mud and swamps—it goes everywhere, loaded with devastation. Peerless engineers designed this deadly attacker. Their "know how" of engineering hydraulics—their everyday knowledge of water problems and their detailed knowledge of pumps, were largely responsible for Peerless engineers becoming the world's authority on amphibian tractor design. *Needless to say, Peerless engineering forces have been greatly strengthened and have knowledge of real value to the pump industry.*

PEERLESS PUMPS
TURBINE, HI-LIFT AND HYDRO-FOIL

PEERLESS PUMP DIVISION *of Food Machinery Corporation*
301 W. Avenue 26, Los Angeles, 31, Calif. ★ 1250 W. Camden Ave., S. W., Canton, 6, Ohio
OTHER FACTORIES: San Jose 5 and Fresno 16, Calif.

When writing, we will appreciate your mentioning **PUBLIC WORKS**

A Great Pair of Values!

DISPERSION AND SUSPENDABILITY IN ACTIVATED CARBON

Nuchar Activated Carbon offers to the water field the added value of greater suspendability and quicker dispersion.

These methods of evaluation are rapidly growing in popularity because they are a means of measuring those physical characteristics of activated carbon which enable each individual particle to accomplish, more economically, the removal of taste and odor producing substances from raw water.

Activated carbon particles which disperse readily throughout the water will greatly increase the immediate adsorption of impurities. However, if the carbon particles settle out in a relatively short time they cannot remove the remaining tastes and odors. Here is where the superior suspendability of Aqua Nuchar proves advantageous, because its carbon particles remain suspended in the water for a longer period of time and have a more prolonged opportunity to provide adequate control.

The extraordinary porosity of AQUA NUCHAR not only results in greater adsorption because of the larger surface area exposed but also accounts for its superior properties of dispersion and suspendability.

BLUEPRINT NOW!

But above all, remember there is a war yet to be won. Maintain equipment to assure operation at 100% efficiency.

NUCHAR

INDUSTRIAL CHEMICAL SALES

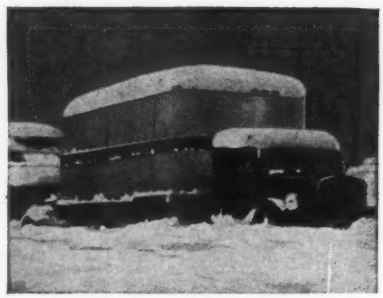
DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. | 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS | 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. | 844 LEADER BLDG., CLEVELAND 14, OHIO

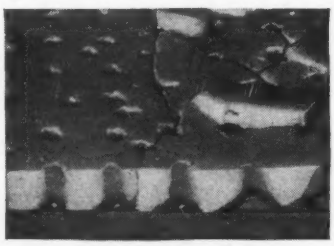
When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

GO

KEEP TRAFFIC SPEEDING despite late winter storms!



You can't gamble on an early Spring! Weather records show late storms are often the worst of the year. But whatever the weather ...vital traffic must get through. Play safe ... keep plenty of Sterling "Auger-Action" Rock Salt on hand. Applied early enough in a storm ... it keeps snow and ice from packing and bonding to pavements—makes complete removal easy for bare pavement maintenance. Traffic statistics show bare pavements are safest. It takes 2½ to 7 times as long to stop a car on ice as on bare pavements!



Even if storms get jump on your men and equipment ... Sterling Rock Salt will do a most efficient job. As model shows, the biting crystals of salt bore through like an auger ...melting hard-packed snow and ice, forming a brine which loosens the bond between them and pavement. Thus loosened and honey-combed, snow and ice can be easily removed by scraper and plow! Rock Salt snow removal treatments are economical. Furthermore, *straight* Rock Salt cuts maintenance costs by eliminating the necessity of cleaning streets and catch basins which ordinarily become clogged with sand and cinders during a thaw!

Sterling

"Auger-Action" ROCK SALT

• **FOR ICE PREVENTION**

Write for bulletin containing all the facts on the most efficient and economical solution to your ice prevention problems. Free consultation with an International field engineer, upon request. Write to Dept. PW2, International Salt Co., Inc., Scranton, Pa.

When writing, we will appreciate your mentioning **PUBLIC WORKS**

tiff where evidence is presented by the defendant which weakens the inference of negligence arising under the res ipsa loquitur rule, though it does not conclusively rebut it. Very little evidence will be enough to rebut the presumption.

Repairing a Main Valve Without Shutting Off Pressure

By HOWARD MAC MILLIN
Superintendent of Water Dept., Haddonfield, N. J.

In making repairs to water mains it is sometimes necessary to shut off the pressure in one or more blocks by closing several main line valves. However, we avoid this when possible, but try to play safe by closing all but one of the valves controlling the stretch to be repaired, leaving this open enough to provide the necessary flow but so that it can be closed entirely in a few seconds if necessary.

Last summer we found it impossible to close a valve that had been in service for about 30 years, and on digging down to it found the stem broken off. We wished, if possible, to repair the valve without removing it or even shutting off the pressure, and succeeded as follows.

We drove the valve disc down into shut-off position and drove wedges tight through the stem hole way, making it possible to take the valve apart and get the broken stem out. The valve had been in the ground so long that we could not read the maker's name so as to get a new stem from them, but we had one made similar to the old one and put it in place. No one was without water during the whole job.

Earnings of County Highway Equipment Provide Replacement Fund

Reporting to the Board of Supervisors of Hancock County, Illinois, in 1943, J. R. Fay, Superintendent of Highways for that county, said that most of their equipment is getting old, some is already obsolete and has depreciated from a cost value of $45,272 to a cash value of $18,424. "While new equipment cannot now be purchased," said he, "serious consideration should be given to replacement of obsolete equipment at the earliest possible time."

Detailed statements of operation costs and times in actual service "show that this equipment earned, at the ownership rental rate established by the State Highway Department for Motor Fuel Tax Rental, more than its present cash value, that the net earning over and above operating costs was $12,376.07 and that cash received for equipment rental from motor fuel tax and other sources amounted to $8,996.33; which shows that the equipment now owned is not only paying its way but that, if this income was placed in a separate replacement fund each year, it would finance the replacement of equipment when needed."

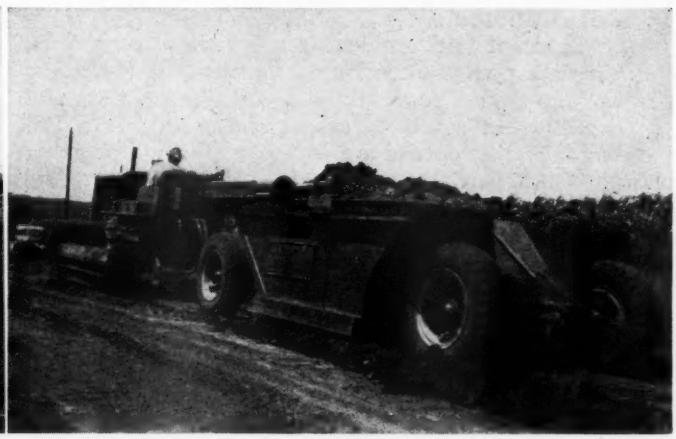
Such a fund was established in June, 1943, and on December 31 showed a cash balance of $18,000.

The major equipment owned by the county comprises 3 maintenance patrols, 3 1½-ton trucks, 4 ½-ton trucks, 4 tractors, 1 power mower, 1 hydraulic scoop, 1 water pump, 1 air compressor, 1 electric motor, 4 snow plows, 6 road drags, 4 blade graders, 1 multiple-blade maintainer, 1 scarifier, 1 slip scraper, 5 wheel scrapers, 1 pneumatic roller, 1 corrugated farm roller, 1 farm disk, 1 sand spreader, 2 water tank sprinklers, 3 truck tanks. Of these, 22 were purchased between 1930 and 1936. The 4 newest were purchased in 1942.

WARCO ROAD MACHINERY

The war is not won. Many more hard battles must still be fought. Until Peace is established, WARCO will continue to furnish equipment for the Armed Forces. In WARCO Road Machinery has been developed the stamina necessary to withstand the rigors of war's demands. Now only highest priority can obtain these machines, but some day we will again be filling your orders for WARCO Equipment, best in the long run.

WARCO HYDRAULIC CONTROL MOTOR GRADERS, through constant improvement and advanced engineering are second to none on the market. Powerful hydromotors afford fast, easy, precise action with minimum operator effort. Simple, sturdy construction assures continuous operation, long life and job economy on the toughest jobs.



WARCO-DUPLEX HYDRAULIC SCOOPS are time-tested, efficient dirt movers. Simple construction and design afford quick, flexible action. With short wheel base for operation in confined areas, rear ejection, controlled dumping, and above all, easy loading, these scoops handle all dirt moving jobs with magic ease.

Watch for detailed announcements on WARCO'S practical light weight Power Maintainer, incorporating latest developments in road maintaining equipment; also, on the light Pull Type or Terracing Grader and the Rotary Scoops, for ditching, terracing, maintaining roads and dirt moving, at low cost. These machines are built right and priced right.

Limited distribution now on WPB releases or approval—but ready for post-war construction.

W. A. RIDDELL CORPORATION, Bucyrus, Ohio

New Standard Specifications for Pipe

The U. S. Department of Commerce has published a "Recommended Commercial Standard for Bituminized-Fibre Drain and Sewer Pipe, TS-3619," which is acceptable to a majority of interested distributors and users. The specifications cover pipe of 2″ to 8″ diameter, in 5 ft. and 8 ft. lengths, with 45° and 90° bends and both straight and 5° angle couplings.

The material used is a bituminous compound reinforced with an interwoven fibrous structure, with smooth interior surface. The joints are made with couplings, pipe and couplings having ends tapered 2°. All sizes are made in 8 ft. lengths, and the 2″, 5″, 6″ and 8″ sizes in 5 ft. lengths also.

Bends for 2″ pipe have radius of 9.5″, 18″, 24″ or 36″; for 3″ pipe, radius is 13″, 24″ or 36″; for 4″ pipe, 16″ or 36″; for 5″ pipe, 24″ or 36″; for 6″ pipe, 36″; for 8″ pipe, 48″.

The specifications require the material to be resistant to acids, alkalies and salts; tests being made by 30 days' immersion in solutions of 0.1 normality of sulfuric acid, sodium carbonate and sodium sulfate. After 8 hours at 180°F. there will be no exudation of pitch or flattening of the pipe.

Sewage Gas Hazards

All sewage plant operators know—or should know—that sewage gas, like city illuminating gas, is dangerous if not handled properly and poisonous or asphyxiating if taken into the lungs. But such accidents so seldom happen that the hazards are apt to be forgotten. As a reminder we reprint the following, by Louis Birkel, Jr., sanitary engineer with the Kentucky Dept. of Health, which appeared in the *Bulletin* of that department.

"A recent fatal accident in a sewage plant in West Virginia directs attention to the need of reminding workers around sewers, cesspools and sewage disposal or treatment plants to use extreme caution. In this case, a worker opened a pipe line, allowing a pumping pit to fill partially with sludge. He was killed, and so were two other men who attempted to rescue him.

"Sewage gas, normally, is a mixture of carbon dioxide, carbon monoxide, methane, and, occasionally, hydrogen sulfide. Carbon monoxide and hydrogen sulfide are both highly toxic gases. Concentrations of these two gases as low as 0.5 to 1.0 percent may be fatal. Methane and carbon dioxide are not poisonous, but may dilute the oxygen of the air to the point where asphyxiation may occur. Sludge gas may also become very explosive when mixed with 6 to 15 volumes of air to one volume of gas.

"In view of the dangerous qualities of sewer gas, extreme care should be exercised around all locations exposed to it. Places in which solids collect in sewers should be eliminated. Any odors should be traced to their source or sources and the cause or causes eliminated, rather than sealing the manholes against odors. At the treatment plant, all wet wells, screen chambers, channels, and all pockets where sludge may collect should be kept clean at all times. All piping and gas handling equipment should be kept gas tight at all times. Frequent inspections of such equipment should be made.

"When it becomes necessary to enter any place where gas could accumulate, all sludge should be emptied completely and the tank cleaned with water. When the workman descends into the tank, he should wear a gas mask and a safety harness, with a strong rope attached, and there should always be sufficient personnel ready to remove him in event of accident.

"The plant should have on hand several gas masks, a safety harness, fire extinguishers, and equipment for detecting explosive gases and hydrogen sulfide. The plant personnel should know how to administer artificial respiration and should have a list of doctors in case of an emergency."

See also the "Sewerage Digest" in this issue.

Pasadena, California, Water Department

(Continued from page 17)

consumers for $1,211,209. Since then it has acquired 33 other water systems. In 1934 it completed the $7,500,000 San Gabriel project, the gravity supply from which provided most of the city's consumption until Aug. 1, 1941, when it was transferred to the Metropolitan Water District, through which Colorado River water is supplied to southern California. The assets of the department last June were $6,796,962, and the liabilities $73,559, including $55,250 in bonds outstanding. It has paid all capital costs, as well as operation and maintenance, from its revenues; has furnished water free for fires and sewer flushing, and paid for every service received from other departments, including rental of space occupied in the city hall. It owns $1,073,186 in government and municipal securities, "accumulated as a reserve against a possible emergency and to finance future construction," thus having "an excellent backlog to take care of postwar needs."

Part of this reserve fund it has been able to accumulate because of the decline in extension and improvement expenditures due to war restrictions. Last year's expenditure of $476,661 for new construction is less than for any previous year in the department's history. However, the regular maintenance and repair work was carried on as in other years, and in addition armed guards were employed to keep a close watch on all water supply and distribution facilities, which include 12 reservoirs and 23 pumping stations housing 40 pumps. No attempts at sabotage were reported during the year.

Two years ago the rates were reduced, so that the average cost to a consumer under the domestic rate was reduced from 15.9 ct. per hundred cu. ft. to 14.3 ct. Beginning in April 1942 there has been a special rate for victory vegetable gardens, giving the use of 6″ depth of water over the garden area each month at approximately one-half the domestic rate. As of June 30, 1943, 2761 applications for the garden rate had been granted, for a total area of 218.42 acres.

The year of this report was a wet one, the precipitation totaling 33.33 in. (160% of normal); but one-half of this fell in the last ten days of January, resulting in relatively high runoff (and damage to intakes and pipe lines) and adding no material amount to the underground storage. Wells furnished 490,245,400 cu. ft. of the 721,489,700 cu. ft. used during the year, 68% of the total and 39% more than during the previous year.

As all but the most urgent construction work has been discontinued since Pearl Harbor, there will be considerable to be done after the war is over. The Engineering Division has been making a survey of needed improvements and is preparing preliminary

plans so that construction can be undertaken soon after the cessation of hostilities, if so desired.

The projects recommended are as follows:

Item	*Estimated Cost*
Villa reservoir roof	$124,000
Sheldon reservoir No. 1 roof	47,000
Concrete reservoir at Brigden reservoir, site, capacity 1,500,000 gallons	45,000
Concrete reservoir at Sierra Madre Villa site, capacity 1,500,000 gallons	45,000
Warehouse building	45,000
Santa Anita feed main	68,000
Main and service replacement	300,000
	$674,000

All of the projects are needed and worthwhile improvements.

The Stores Division of the department was rehabilitated prior to the beginning of the fiscal year 1942-43. Due to the increasing number of governmental regulations of all kinds, and to the control of all utilities by the War Production Board, a comprehensive system of records and reporting procedure was instituted.

The governmental agencies involved in the supervision of the activities of this department are, the War Production Board, which regulates the purchases, withdrawals, and inventories; the Office of Price Administration, which prescribes the price at which materials in excess inventory may be sold; the local Rationing Board of the Price Administration, which rations tires, tubes, and gasoline; and the Office of Defense Transportation, which governs the use of automobile equipment.

The various governmental agencies have required numerous reports covering practically every activity of the department. The preparation of these reports has been a big task. The department has been fortunate in that most of them were accepted without comment. In fact, no criticism has yet been received of the department's method of operation or its accounting system.

Rats in Garbage Dumps

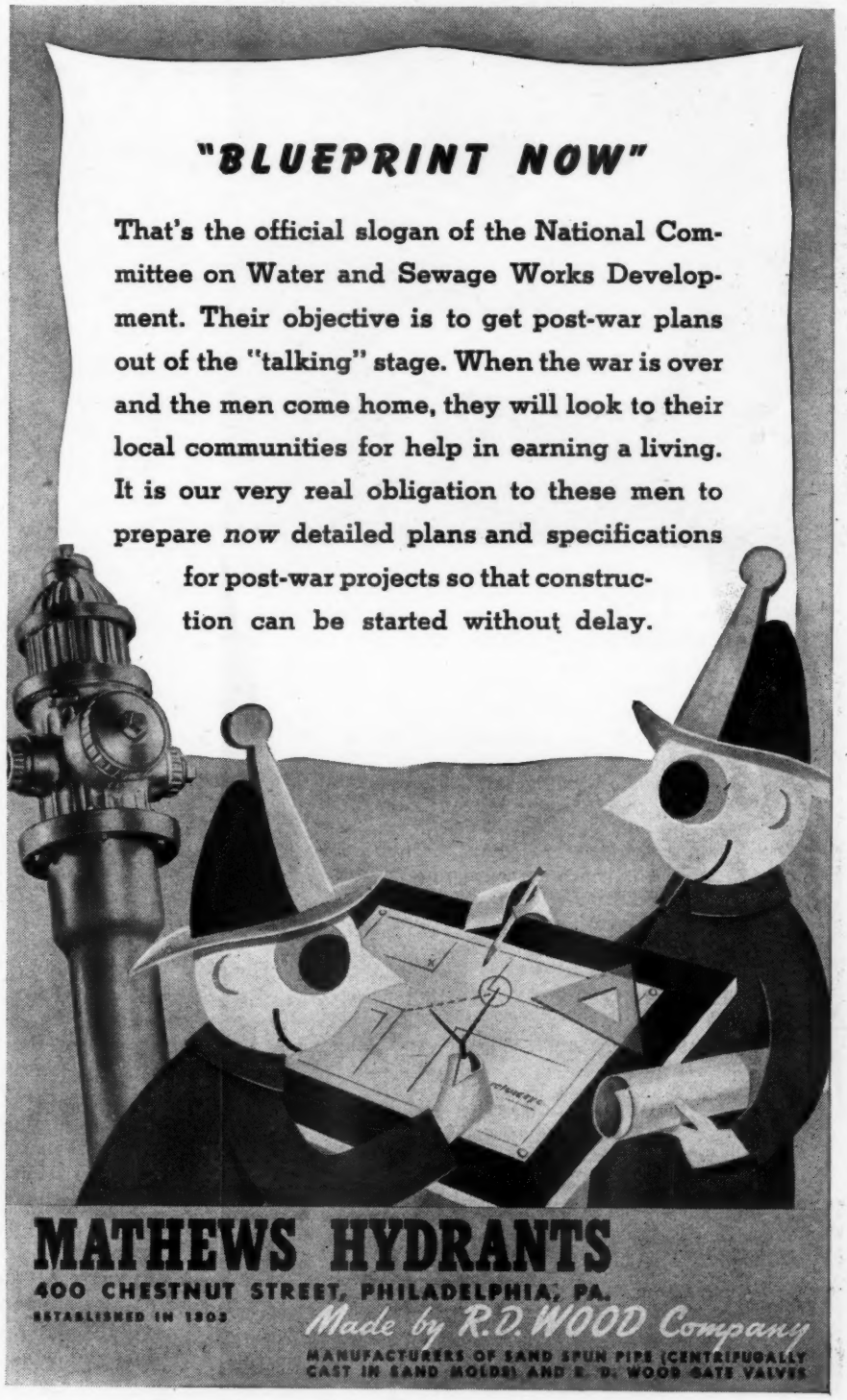
In connection with its rodent surveys, garbage disposal was studied by the department in 15 counties of California. This included 14 cities in some of which the rodent situation was found to be acute. In one city, more than 500 rats were poisoned on the local garbage dump. In 25 other cities throughout the State, garbage dumps were inspected and advice given relative to keeping the rodent population in such places under control.

Post-War Planning for Off-Street Parking

In a paper before the Street and Highway Traffic Section of the 32nd National Safety Congress, D. Grant Mickle, City Traffic Engineer of Detroit, Mich., discussed the means of providing off-street parking facilities, a subject that is expected to become even more important when war restrictions on automobile traffic is removed than it was before the war. The author advised that this be included in cities' post-war planning, and made the following suggestions:

There are three general means of providing off-street parking facilities: (1) private, (2) privately operated public, and (3) public.

The private facility provides parking space to occupants of given buildings. It may be given as an inducement to rent building space, or may be charged


"BLUEPRINT NOW"
That's the official slogan of the National Committee on Water and Sewage Works Development. Their objective is to get post-war plans out of the "talking" stage. When the war is over and the men come home, they will look to their local communities for help in earning a living. It is our very real obligation to these men to prepare *now* detailed plans and specifications for post-war projects so that construction can be started without delay.
MATHEWS HYDRANTS
400 CHESTNUT STREET, PHILADELPHIA, PA.
ESTABLISHED IN 1903
Made by R.D. WOOD Company
MANUFACTURERS OF SAND SPUN PIPE (CENTRIFUGALLY CAST IN SAND MOLDS) AND R. D. WOOD GATE VALVES

Communications
AS MODERN AS AT HOME
At war, code messages flash between advanced posts and control centers. For speed and accuracy, teletypes are used, their vital electric power supplied by gasoline engine-driven generators. Another of the hundreds of uses for the hundreds of thousands of dependable Briggs & Stratton 4-cycle, air-cooled gasoline engines now serving our armed forces.
INQUIRIES are requested from those manufacturers who require portable gasoline engine power for war production — or for their post-war gasoline-powered equipment now being planned.
We are better prepared than ever to carry on the traditions of Briggs & Stratton engines — with the same high standards of quality and precision manufacture, their rugged dependability, easy starting and economical performance — all the features that have earned for Briggs & Stratton the reputation as builders of "the world's finest air-cooled gasoline engines."
"It's powered right — when it's powered by Briggs & Stratton."
BRIGGS & STRATTON CORP.
MILWAUKEE 1, WIS., U. S. A.
ENLIST YOUR DOLLARS
BUY WAR BONDS
4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

When writing, we will appreciate your mentioning PUBLIC WORKS

for. It is not open to general public use, and is generally financed as a part of the business activity to which it is attached.

The privately operated public facility is today providing the largest capacity of off-street parking in downtown districts. Payment for these commercial facilities is made in several ways: (a) direct payment by motorists, (b) payment by business firms for their customers, or (c) a combination of (a) and (b). Parking fees must pay taxes, operative costs, and license and insurance fees, as well as compensating the operator.

Municipal ownership offers different opportunities for financing. The land may be city-owned through tax delinquency or gift, or may be a parcel remaining from some previous public works project. The fee for parking need not include high tax costs but may be limited to cover improvement and operating costs. On the theory that the whole city would benefit, part of the costs may be charged against the general tax levy, or parking meter revenues may be used.

An extensive system of parking terminals will be a necessary feature of post-war planning developments. Surveys, plans, acquisition of land, and passage of enabling legislation can be carried on now in preparation for post-war construction.

More Water, Please

(Continued from page 16)

does not constitute a total loss of recirculated water, as even some pump salesmen appear to think. May I point out that the cost of operation of the "gooser" is composed of its own inefficiency plus the small added losses in the pump and driving motor, as whatever boosting effect is attained is useful work (or it would over 20% of the net water pumped, the cost for electric energy is only 7.5% more than for normal operation with the pump alone. Needless to say, we were only too glad to pay this small price for service that could not have been maintained otherwise. On one day 1,330,000 gallons were pumped without any trouble. This turned out to be a very fortunate solution in our case, as, due only to the lack of rain, many industries, farmers and dairymen had to drill new wells, add turbine bowls, lower suction pipes, and install larger pump motors. However, this "gooser" installation is not the permanent answer to the whole problem.

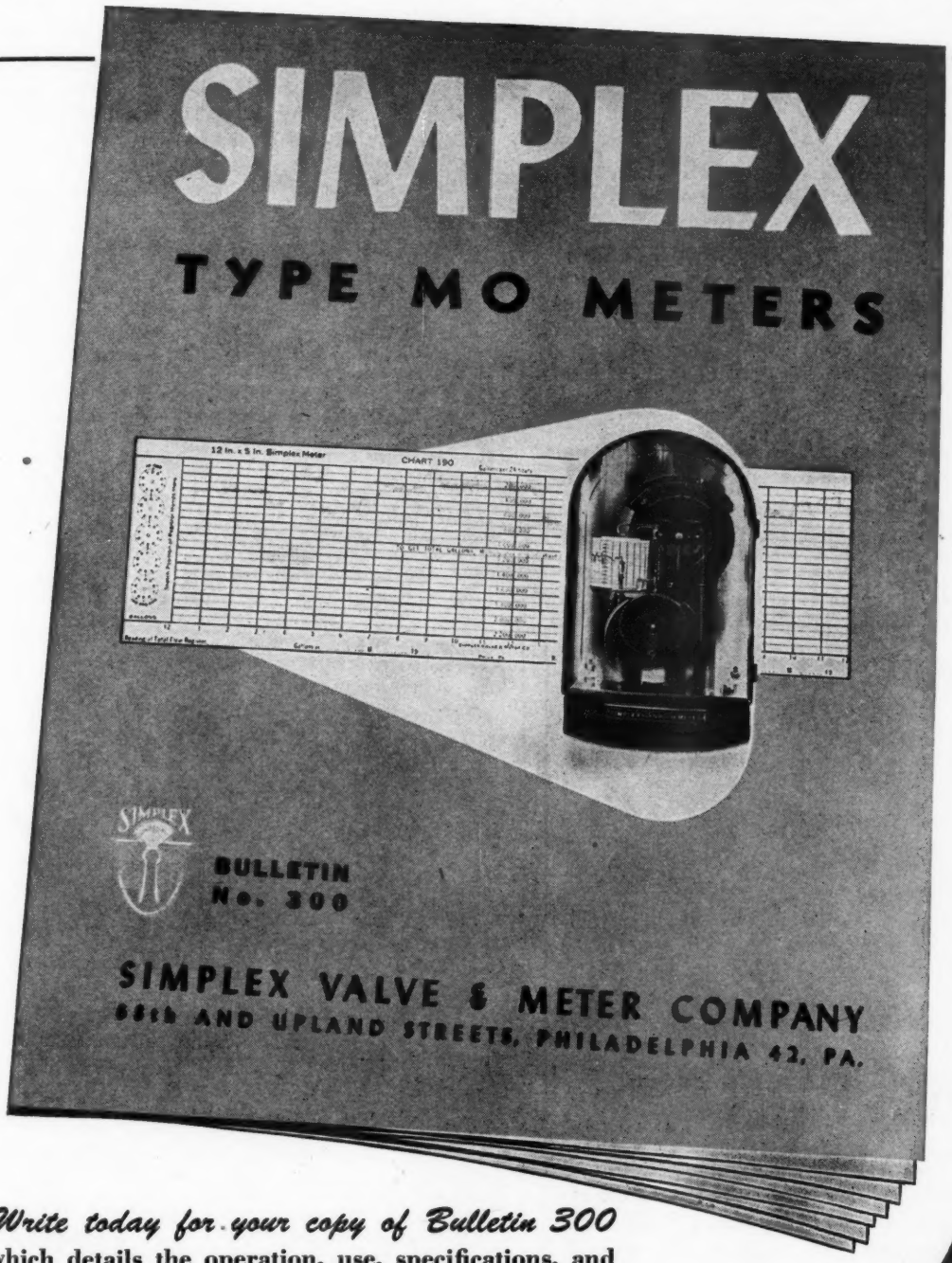
The California Corrugated Culvert Company of Berkeley fabricated a tube for the second De Laval pump for standby purposes. This second installation has a one-inch jet and a five-inch throat. It is not so spectacular in its operating results, but adds 100 gpm to net water pumped at a much less volume of water recirculated. But neither installation is satisfactory for steady use without the jet in operation, as "wire-drawing" the water through these small throats introduces some turbulence and friction.

More Plans. The high vacuum still exists on the suction main, with the result that any small pin-point of leakage introduces aggravating quantities of air; and even small amounts of air under these conditions are magnified beyond reasonable proportions. The jet handles large quantities of air which would otherwise stop pumping, but if certain conditions exceed the capacity of the air relief valve, then many queer (?) things happen:—dissolved air suffocates most of the goldfish in the city; near-by consumers have utensils knocked from their hands when drawing water at the kitchen sink; and water hammer blows up old boilers

HERE ARE ALL THE FACTS ABOUT THE

SIMPLEX TYPE MO METER

The High-Accuracy Flow Rate Meter



Write today for your copy of Bulletin 300 which details the operation, use, specifications, and accuracy of the Simplex MO flow rate meter. Specified by operating men and management from coast to coast.

SIMPLEX VALVE & METER COMPANY

6750 UPLAND STREET, PHILADELPHIA 42, PA.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

and house plumbing prematurely. Another objection to high vacuums is that the siphon to the pump works at reduced effect when the pipe is mostly filled with near-vacuum.

As a solution to most of these objections we plan (WPB and Fairbanks Morse Company willing) to install small turbine pumps in all of the wells before the next heavy pumping season.

River erosion will eventually again be controlled by a new $25,000 permanent collapsible dam now being designed by H. M. Engle, a structural engineer of San Francisco. We hope to regain some of the lost river channel elevation by constructing the base of the new dam slightly above the thread of the river, which will allow the channel to fill in and replace part of the missing material.

The six small turbine pumps which we hope to obtain are rated at 250 gpm each at eleven feet head. This head was arbitrarily chosen as best suited to the local needs. The pump runners were particularly selected as having a steep head-discharge characteristic, which will permit priming the suction line when the De Laval pumps are not running; will tend to make the whole installation non-overloading; will operate satisfactorily with any one turbine pump shut down at any time; allow two turbine pumps to be removed each winter for complete overhauling; and in periods of extremely high river stages the turbine pumps can motor and prevent the main pumping unit from "pulling the bottom out of the wells."

The WPB may be slow and loath to deviate from their Limitation Orders, but they surely know their onions when it comes to pumps. We wished to use 1,200 rpm pumps, and after nearly three months of exchanging ideas by wire, air mail and slow freight they granted us relief from L-221. Our contention was that if it ever became necessary for us to increase the capacity of the plant it would only entail changing motors to a larger size and 1,800 rpm. The pumps would not even have to be removed from the wells to double their head and add 50% to their capacity. This would make it possible to run both of our main pumps on peak load, or to use larger pumps when conditions warranted.

To be sure, we are not out of the woods yet, not knowing what the river will do this winter in the way of additional erosion; and having no way of divining next year's pumping duty; but at least we have a few months to relax and trust that we can cope with future conditions with the new equipment.

FOOTNOTE: A Councilman suggested that we publish a communication requesting our customers to use as little water as possible during our emergency shortage, but I stopped that quickly. I remembered an experience in December, 1937, when a flood prevented us from operating the pumping plant for five days. I was keeping a curve of lowering water reserve in the reservoir, and at the end of the third day I ran a notice in the evening paper explaining that we had plenty of water for drinking, cooking and essential sanitary purposes, but asking people to conserve water and make the remainder go as far as possible. Immediately the use of water more than doubled! Everyone took a bath (in the middle of the week), housewives all did washings and strung clothes all over the house to dry, then filled bath tubs, buckets and all available utensils for their own little emergencies.

So, in this case I knew that everyone would decide that *his* garden wasn't going to be the one to dry up. The dear public is necessary, but not to be trusted.

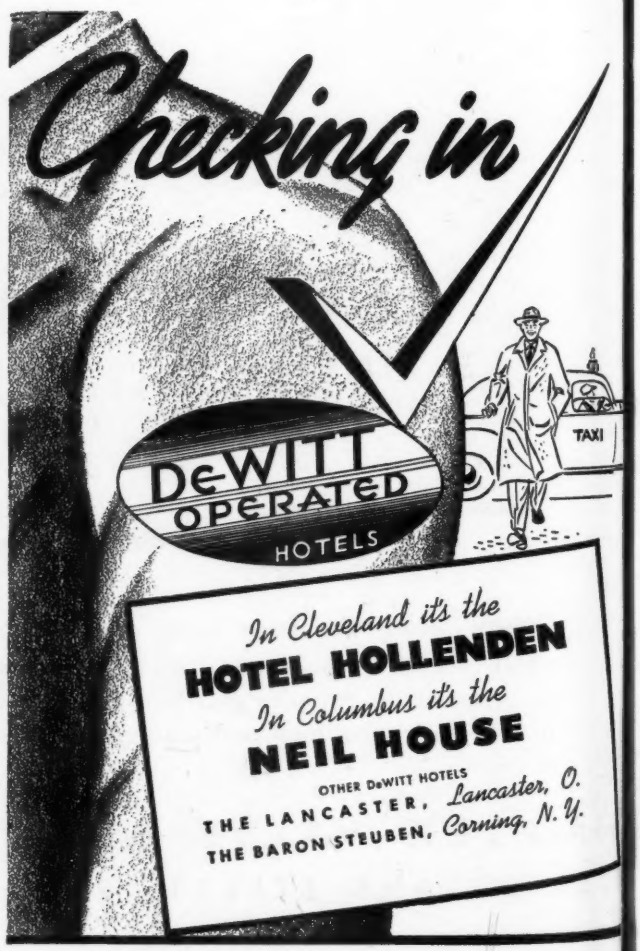
Earth Does This to Wood

CUPRINOL Protects Wood From Rot

Here are boards from beneath a coal pile, rotted and warped from contact with the earth. An extreme use of wood, yes, but wherever wood has contact with the earth —in fence posts, benches, poles, building sills—rot and insect borers do devastating damage. But you can stop this damage with Cuprinol, a liquid easily applied by brush, spray or dipping, used either by itself or as a priming coat. Reduce your budget for repairs by Cuprinol treatment of the wood, canvas and rope for which you are responsible.

You'll want data. Write us for it.

CUPRINOL, Inc., 24 Spring Lane, Boston 9, Mass.



Statistical Abstract of the United States for 1942

The 1942 edition of the Statistical Abstract of the United States is now available from the Superintendent of Documents, Washington 25, D. C. This volume of over 1,000 pages is the 64th annual edition of this publication, which includes summary statistics on many subjects from governmental and non-governmental sources.

In order to obtain information which will be useful in evaluating material to be included in this volume, a postcard has been inserted in each copy of the new edition. Readers of this journal who are users of the Statistical Abstract are urged to fill in and return this postcard. Comments and suggestions for improving the usefulness of this book will receive careful consideration. Such letters should be addressed to the Director, Bureau of the Census, Washington 25, D. C.

The Recommended Interregional Highway

(Continued from page 14)

the interregional system and other recommended work on highways and streets would provide direct and indirect employment for 2,000,000 men after the war.

The Defense Highway Act of 1941 authorized apportioning $10,000,000 among the states for making surveys and plans for future highway construction, and the authorized use for this purpose of $50,000,000 of unobligated balance of Federal-aid highway funds should provide for the surveying and planning needed for beginning postwar construction of the proposed highways; but, said General Fleming in transmitting the report, "There is, however, another equally important measure of preparation that must be taken if work on the planned projects is to begin promptly when peace returns. Rights-of-way for the planned improvements must be in hand; and funds for this purpose, clearly expendable during the war, should be made available. The recent Act of Congress (Public Law No. 146—78th Congress) provides for payment of the Federal share of the right-of-way costs of post-war projects *only after construction has been actually begun.* The States are required to advance from their currently reduced revenues, for the period of the war, the whole cost of rights-of-way acquired. Their inability to do this in many cases means that essential rights-of-way will be lacking when construction should be started, and the purpose of the wise provision that has been made for advance planning will thus be in large measure defeated. Moreover this right-of-way obstacle is likely to be most serious in the case of the very important projects that are being designed to relieve traffic congestion in cities, projects that will afford, if they are ready, large employment in the precise places where the need of employment will be greatest.

"To remedy this unfortunate defect in the preparatory measures that have been taken, I strongly recommend Congressional action to permit the Federal Government to pay promptly its proportionate share of the costs of rights-of-way acquired in anticipation of post-war highway improvements."

The subject of right-of-way acquisition is discussed in another article in this issue.

WHEN THERE'S NO TIME FOR BREAKDOWNS IT'S TIME TO GET A GORMAN-RUPP PUMP

Today, when time is the essence, you need a Gorman-Rupp Self-Priming Centrifugal Pump more than ever. There is not a quitter among them. The water passage has the same area as the suction hose. Muck, gravel, cinders—you simply can't clog them because solids cannot accumulate. There is no recirculation orifice to clog—no shut-off valve to jam—no hand priming regulator. There isn't a self-priming centrifugal pump made that will outwork a Gorman-Rupp in gallonage or continuous hours. Gas engine or electric motor driven. Capacities up to 125,000 GPH. There is a type and style to fit your every requirement. Stocked for immediate delivery in 100 principal cities.

GORMAN-RUPP SELF-PRIMING CENTRIFUGAL PUMPS

THE GORMAN-RUPP CO. Mansfield, Ohio

In Philadelphia it's the

HOTEL PHILADELPHIAN

Entirely redecorated and refurnished, including a radio in every room. Highly recommended by experienced travelers the world over for its warm hospitality; its excellent cuisine served in comfortably air-conditioned restaurants; its convenient location to the business section; and its unlimited parking facilities.

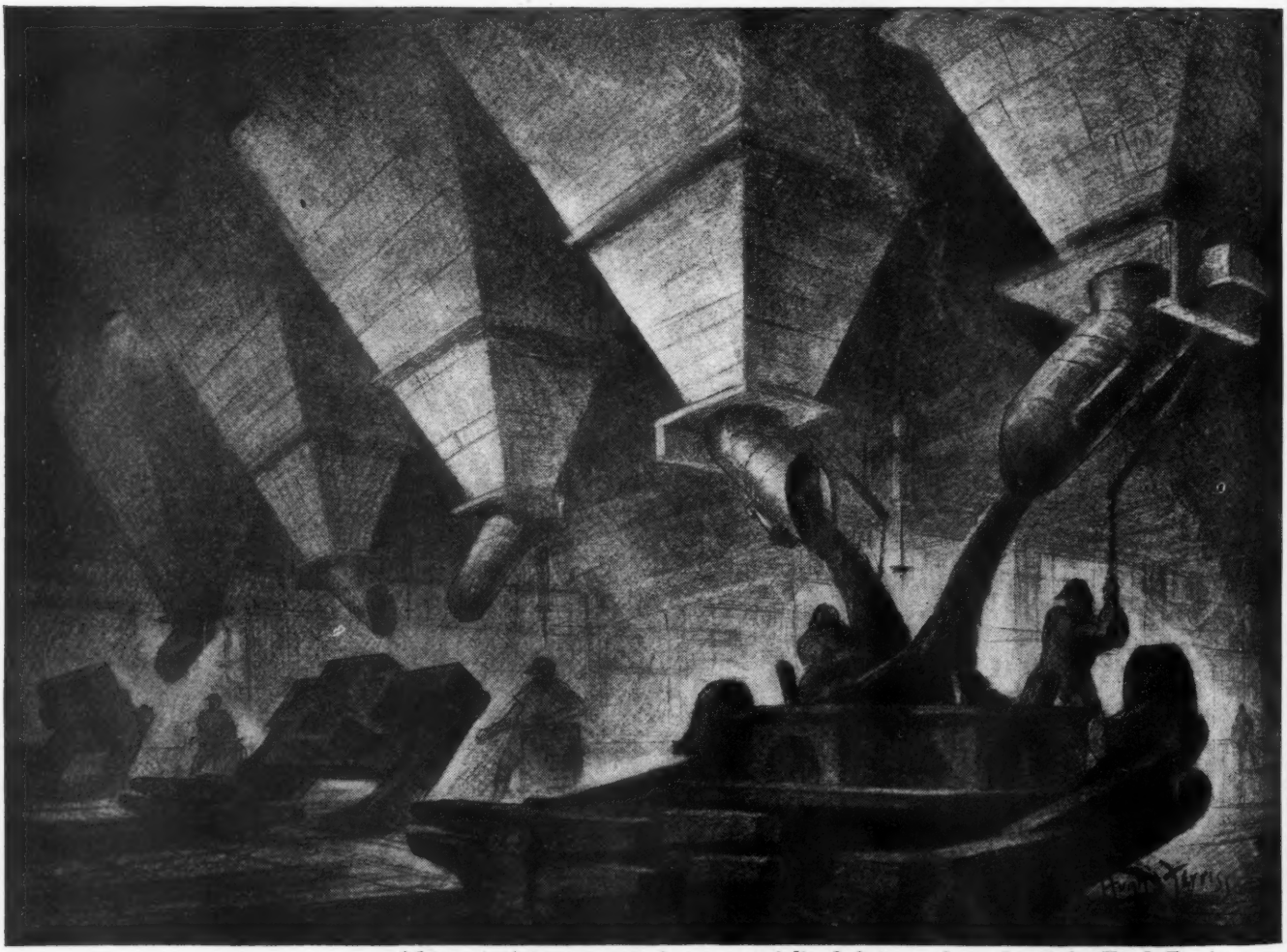
600 Rooms and Bath with Radio from $3.00

DANIEL CRAWFORD Jr., President and General Manager
39th and Chestnut Streets, Philadelphia, Pennsylvania

When writing, we will appreciate your mentioning **PUBLIC WORKS**

For greater uniformity

The illustration below shows one step in our mechanized method of making cast iron fittings. The sand pouring into the flask has been mechanically mixed and laboratory tested. The flask with pattern in place is firmly fixed to the jar-rammer which mechanically rams the mold to a controlled, and the desired, density and contour. We believe that the mechanization of processes, wherever possible, in the manufacture of our products makes for greater uniformity. Quality control in the manufacture of U. S. Cast Iron Pipe, Fittings and Special Castings is maintained by skilled laboratory technicians from raw materials to the finished product.



A battery of jar-rammers in our specialized fittings plant, drawn by Hugh Ferriss

UNITED STATES PIPE & FOUNDRY CO.

General Offices: Burlington, New Jersey. ***Plants and Sales Offices throughout the U. S. A.***

When you need special information—consult the classified READER'S SERVICE DEPT., *pages 63-65*

Lancaster, Pa., filtration plant gallery.

The Waterworks Digest

Abstracts of the main features of all important articles dealing with waterworks and water purification that appeared in the previous month's periodicals.

Emergency Sterilizing of Distribution System in Galveston

Galveston, Tex., which is located on an island, obtains its water supply from deep wells on the main land. It is lifted by electrically driven turbine pumps into a long influent main to the island, where the pressure is raised by both electrical and steam pumps. The influent main lies under polluted salt water between the main land and the island. On July 27, 1943, a hurricane disrupted the electric power service, putting the deep well pumps out of commission and also the booster pumps that filled tanks in the many tall buildings. There was some water stored in the city, which the steam pumps supplied into the distribution system, but this was entirely consumed in a few hours.

The next day, with mains and service pipes empty, electric power was restored and the city pumps put the influent main under negative pressure, probably sucking in polluted water from the subaqueous crossing and sewage-polluted soil. Also there was back-siphonage of plumbing fixtures in many buildings. Of 40 samples collected in all sections of the distribution system, 37 showed presumptive index and 17 confirmatory of coli organisms.

Citizens were urged to boil all water before using. The mains were thoroughly flushed; then chlorine applied at the main pumping plant on the island at 5 ppm, passing the break-point and giving residuals of 2 ppm. By flushing hydrants, chlorinated water was drawn to all parts of the system until residuals of 0.5 to 1.0 ppm were obtained. Eight days after the storm, positive chlorine residuals had reached every part of the city, in most places 1.0 ppm or more.[F1*]

Activated Carbon In the United States

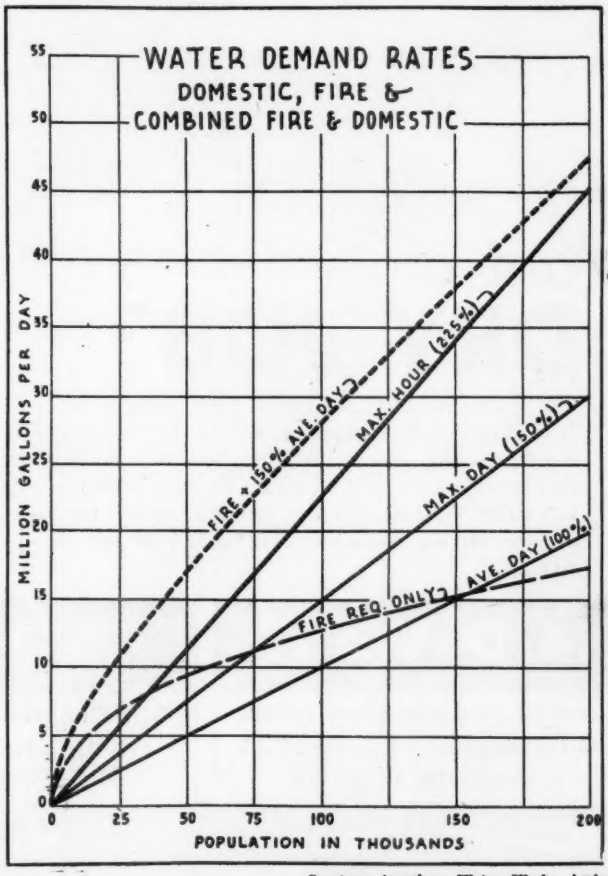
As nearly as can be ascertained, 1,164 plants in the United States use activated carbon, some only during the continuance of special conditions. The dosage in pounds per million gallons of annual consumption averages about 9 for river water and 12.5 to 13.0 for creeks, lakes, reservoirs, etc.; but this means little, since some plants use carbon for only a few weeks in the year. Trento, Mich., used 730 lb. per m.g. in 1940. Tastes and odors in flowing streams are usually associated with trade waste pollution, but those in still water supplies with algae, which seem to be the predominating cause of taste and odor.

Of the plants reporting, 78% applied carbon prior to sedimentation, 19% to the filters, and 3% as a split treatment.[A20]

Value of Water Storage

Ordinarily the maximum 24 hr. consumption in any year is about 50% more than the average day, and the peak hour is 50% greater than that rate, or 2½ times the year's average. These peaks can be provided for by storage in reservoirs or elevated tanks. Ordinarily, storage equal to 20 to 40 gal. per cap. will permit keeping the pumping rate constant throughout the 24 hr.; and 25% of this storage would lower the peak rate of pumpage by half its excess over the daily average.

Elevated tank storage sufficient to completely iron out hourly peaks would cost, for interest and depreciation at 6%, but 15 to 22 cts per capita per year, equivalent to 25% to 35% of the cost of pumping by electricity. Avoidance of peak demand charges alone may save this amount. To store sufficient water in an elevated tank for fire extinguishing in a town of 5,000 population would cost about $115,000, or 60% of the value of the entire distribution system, and the primary usefulness of a tank is in equalizing hourly domestic consumption rather than fire protection. In some cases, however, a reservoir can be built on a hill with capacity equal to the fire demand, which will relieve the source of supply, pumping equipment and distribution system of the fire demand.



Courtesy American Water Works Ass'n

Water demand rates, by population.

Elevated storage sufficient to iron out the daily variations in flow permits reducing the size of feeder mains, at a cost of 18% of these in one example analyzed. In any city in which feeder main capacity is inadequate, a study should be made of the relationship between storage and additional feeder mains.[A12]

Microstating Office Records

The Portland (Me.) Water District believes it is the first water utility to adopt microfilming of its office records, and that every utility in time will consider the use of this process. Microstats are kept in a safe in another city. This permits reproducing perfectly all of the customer ledgers showing all the different accounts, street numbers, names, register numbers, route numbers, and classifications. The District also has microstated the maps and plans of the distribution system. The entire cost of more than 28,000 impressions has been slightly over $1,100.[G4]

Pneumatic Caulking of Pipe

In 1935 Allentown, Pa., adopted pneumatic caulking of its water mains and since then has used it for 28 miles or 14,000 joints. Of these joints, only six 12" and three 8" have had to be recaulked and three of these had been made by an inexperienced caulker. No bell or spigot has been broken by over-caulking. In a recent leakage survey, no leaks or cracked pipes were found on pneumatically caulked lines. In making the joints an Ingersoll Rand No. 100 air hammer is used. The maximum air pressure carried varies from 65 lb. for 12" pipe to 50 lb. for 4" and smaller. Beginning with the cutting-in chisel, successively larger tools are used, each once around the pipe, up to the largest size that will enter the joint.[G6]

Cathodic Protection Of Steel Water Tanks

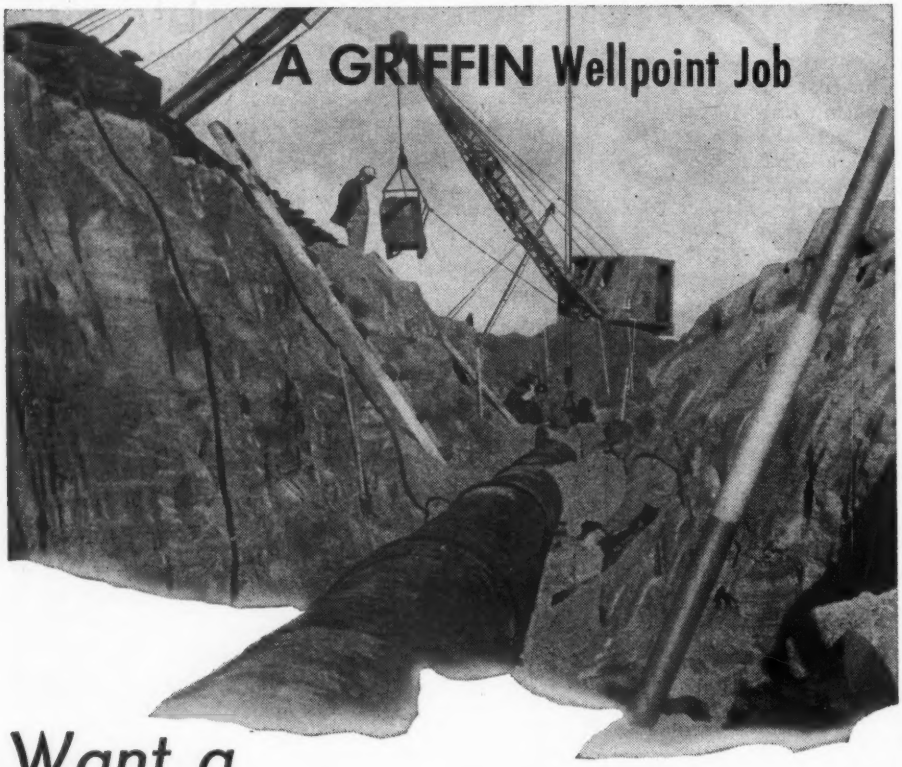
Tests of this method were begun by the Bureau of Water Supply of Baltimore, Md., in 1940 and are still continuing. From them, several conclusions have been drawn; among them that:

"The function of cathodic protection is to plate out the alkaline salts by bringing the pH of a film of water in contact with the steel shell above the calcium carbonate equilibrium point. If the water is in such a state that the cathodic system will not bring the zone of water at the shell to the calcium carbonate equilibrium, no protection from this system is likely. Also if the water contains natural chemicals of such interionic attraction, the amount of current necessary to use for protection would be uneconomical or the voltage may be unsafe to use on water tanks." But the system "will usually be satisfactory on most municipal waters. The method appears to be cheaper and more satisfactory than painting."

Stainless steel electrodes should be 30% chromium of at least 1" diameter or graphite rods encased in woven glass. Monthly inspections should be made of the equipment and the tank. Proper grounding is important if reversed polarity is to be avoided. The rectifier should be fused low to prevent too high amperage being applied accidentally. Lightning arrestors should be placed at the rectifier.

The current used in actual installations varies from 1 to 30 amperes at 5 to 100 volts. In most municipal waters, 3 amperes per 10,000 sq. ft. of water surface is a fair figure to use, but if the calcium carbonate equilibrium pH is of high value, 10 amperes per 10,000 sq. ft. may be necessary. The least current density that will give protection is the best; the higher the current density, the more the oxygen will corrode the electrodes. After sufficient salts have accumulated on the shell, the electrodes can be removed for inspection and replacement if necessary, and this coating will last about 3 months.

In cleaning an old tank, the steel can be made cleaner than by sand blasting, and with much less loss of metal,



Want a
DRY JOB?

NO WATER PROBLEMS — NO SHEETING — NO DELAY for the J. C. Truman Construction Co. of El Dorado, Kansas, on this difficult river crossing. A 24 inch gas line was firmly anchored and buried at depths of 10 to 32 feet. The Griffin Wellpoint System drained up to 9,000,000 Gallons per day permitting job progress in DRY excavation all around the clock. CALL GRIFFIN for these results on your next wet job.

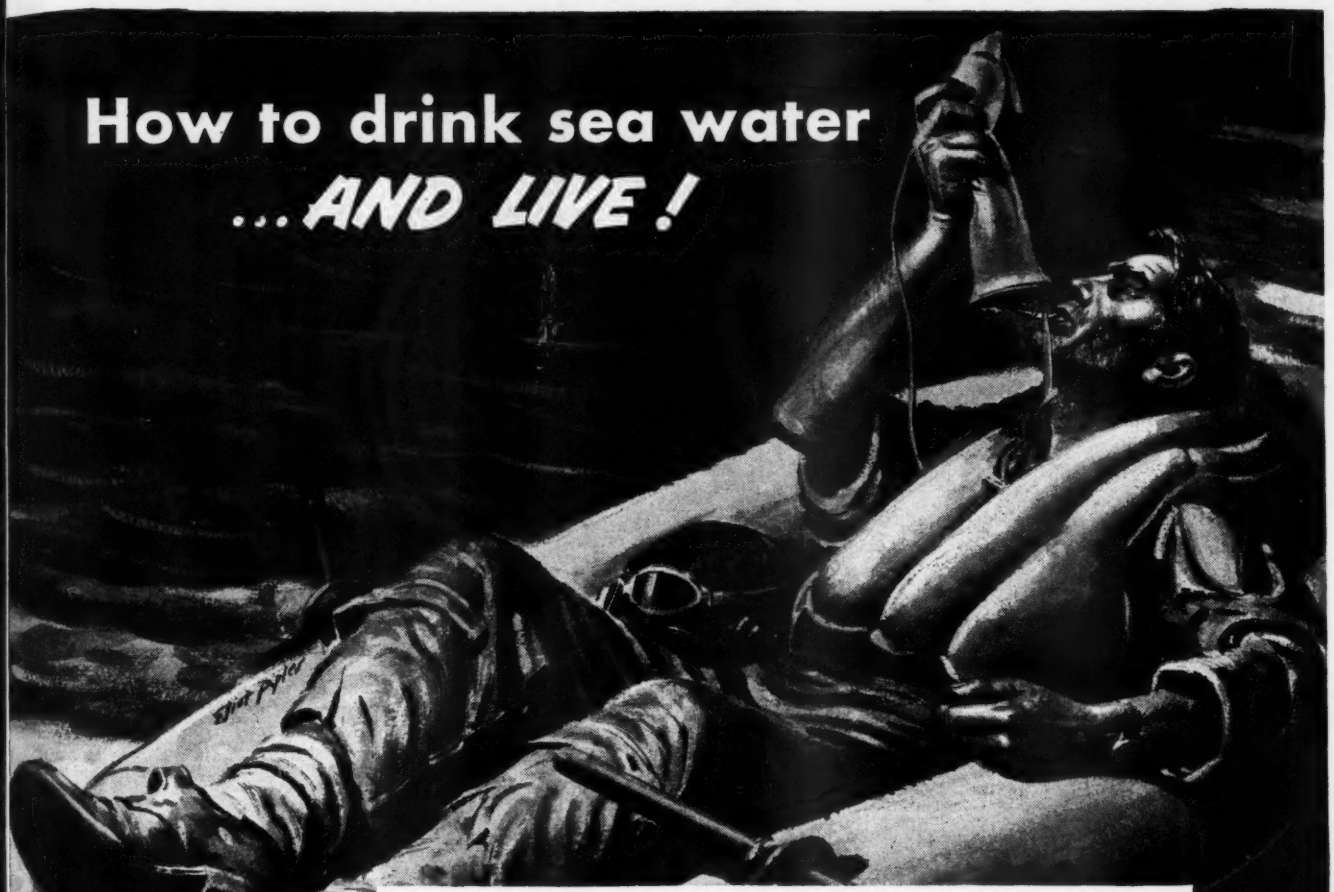
MID-WEST
GRIFFIN ENGINEERING CORP.
548 Indiana Street • Hammond 1662
HAMMOND, INDIANA

SOUTH
GRIFFIN ENGINEERING CORP.
633 N. Myrtle Ave. • Jacksonville 5-4516
JACKSONVILLE 4, FLA.

Main Office: 881 EAST 141st STREET, NEW YORK 54, N. Y.
GRIFFIN WELLPOINT CORPORATION

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

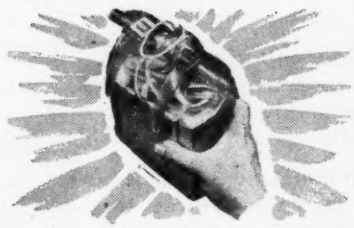
How to drink sea water ...AND LIVE!



FORCED down at sea, this pilot will live to fly and fight again, because thirst—age-old enemy of shipwrecked men—has been conquered. Now he can drink sea water!

Packed with his deflated life-raft, the flyer carries a compact Permutit Sea-water Desalting Kit. Adrift, he simply scoops up sea water in a plastic bag, drops in a small briquet and in a few minutes the water—fresh and clear—is ready to drink. The briquet precipitates the dissolved salts, which are then filtered out as the flyer sucks the water through a tube. Each briquet in his supply will freshen enough water to keep him alive for a day. The whole operation is so simple that it can easily be carried out by a man on a life-raft.

The problem of developing a practical de-salting method was early recognized by Permutit. Here at water conditioning headquarters, chemical engineers worked intensively on it for months and the final product was acceptable to the U.S. Navy, Army and Air Transport Command. The successful result adds one more field to the many in which Permutit's long experience in water treatment is serving our country at war. The Permutit Co., Dept. G4, 330 W. 42nd St., New York 18, N.Y. In Canada: Permutit Co. of Canada, Ltd., Montreal.



The Permutit Sea-water Desalting Kit occupies only one-tenth the space of the drinking water it produces.

PERMUTIT

WATER CONDITIONING HEADQUARTERS

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

by making the water in it acid, and alternately reversing the polarity of the shell from cathodic to anodic at frequent intervals, which will remove the old paint as well as the rust.[X3]

Bibliography of Waterworks Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n*, note or short article; *p*, paper before a society (complete or abstract); *t*, technical article; *article reviewed in the "Digest."

A *Journal, American Water Works Ass'n*
December

12. Importance of the Distribution System. By Louis R. Howson. Pp. 1517-1527.*
13. Some Factors Entering Into the Determination of Water Rates. By J. P. Schwada and E. F. Tanghe. Pp. 1528-1542.
14. Social Security Legislation. By Dale L. Maffitt. Pp. 1543-1550.
15. The Public Utility Goes to School. By E. J. Rowe. Pp. 1551-1556.
16. How Can a Fair Comparison of Water Rates Be Made? By W. Victor Weir. Pp. 1557-1564.
17. Labor Relations in the Public Water Supply Field. By James W. Irwin. Pp. 1565-1573.
18. Battling the Tank Repair Racket. By J. Grant Faye. Pp. 1574-1584.
19. Canadian Water Quality Standards. By Norman J. Howard. Pp. 1585-1586.
20. The Extent of the Use of Activated Carbon. By E. A. Sigworth. Pp. 1587-1592.*

D *The Surveyor*
December 10

4. *p.* Purification of Water by Sterilization. By T. B. Byrne. P. 517.

December 17

5. *p.* Water Engineering After the War. By N. A. F. Rowntree. Pp. 523-524.
6. *p.* The Assessment of Percolation. By P. G. H. Boswell. Pp. 525-526.

E *Engineering News-Record*
December 30

5. High-Stressed Wire in Concrete Tanks. By J. M. Crom. Pp. 51-53.

January 13

6. A 100-Year Water Pipe Design. Pp. 82-84.

F *Water Works Engineering*
December 29

4. Distribution Practices in Queens Borough, N. Y. By John P. Lonergan. Pp. 1430-1433, 1454.

January 12

5. Commission-Operated System Supplies Three Cities. By Richard E. Bonyun. Pp. 18-21.
6. Distribution Practices in Queens Borough, N. Y. By John P. Lonergan. Pp. 22-24, 50.
7. History of Treatment Methods Not in General Use. Pp. 27-31, 52.

G *Water Works & Sewerage*
December

3. *p.* The Distribution System. By L. R. Howson. Pp. 425-429.
4. *p.* Office Records in Water Utilities. By Fred J. Reny. Pp. 437-439.*
5. *p.* Perpetuation of Essential Records in Microfilming. By Charles A. Jortberg, Jr. Pp. 439-442.
6. *c.* Pneumatic Caulking of Pipe Joints. By H. Walter Horn. Pp. 447-448.*

J *American City*
January

4. Plugging an 8 Per Cent Leak. By W. B. Bushway. Pp. 54-56.

M *Water and Sewage*
December

1. Waterworks and Sewerage at R.C.A.F. Aerodromes. By G. Graham Reid. Pp. 11-19, 34.

P *Public Works*
January

4. Returning a River Channel to a Water Intake. By Lloyd B. Smith. Pp. 11-12.
5. How San Antonio Solved a High Service Problem. By W. D. Masterson. Pp. 19-20.
6. Experiences With Victory Alum. P. 34.
7. Serious Results of Lack of Records and Equipment. P. 36.

V *Journal, Maine Water Utilities Ass'n*
January

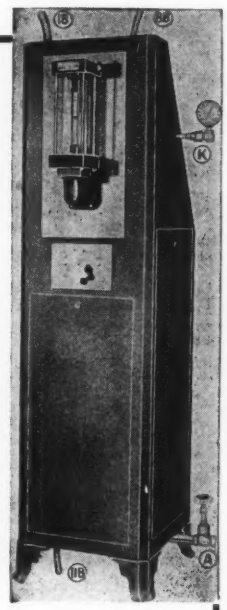
1. Failure of Lower Reservoir Dam at Belfast, Maine. By A. L. Ramsdell. Pp. 14-15, 18-22.

X *Proceedings, Maryland-Delaware Water and Sewerage Ass'n*
Year of 1943

1. Substitutes and Alternatives Used in Wartime Construction and Operation. By Carl A. Hechmer, Clark Gardner, George E. Finck, Wm. B. Spencer. Pp. 1-12.
2. Priorities Information. By H. Lloyd Nelson. Pp. 13-18.
3. Tests on the Cathodic Method of Protecting Steel Water Tanks. By Gordon L. O'Brien. Pp. 37-52.*
4. A Rapid Method of Analyzing Flow in Water Distribution Systems Based on the Hardy Cross Theory. By T. Francis O'Connor. Pp. 61-83.
5. Preparing a Valved Water Distribution System for Emergency Service. By Thomas W. Latimer. Pp. 88-91.

SAFE!

WATER PURIFICATION



- Operated under vacuum so that any accidental break in gas line or water failure draws air *in*, instantly actuating the automatic shut-off!
- One valve control . . . easy to operate.
- Tremendous capacity range . . . meet your present day requirements with plenty of range for future needs.
- Precision metering . . . *Visible* indicating meter measures the gas flow. The most accurate and dependable gas-flow meter yet developed, accurate to a plus or minus ½%!

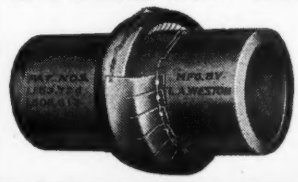
Write for Bulletin

SterElators by Everson

EVERSON MFG. CO.

213 W. HURON ST. CHICAGO 10, ILLINOIS

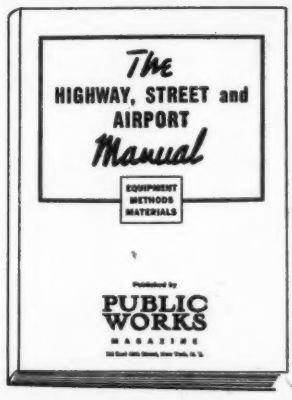
STILL IN THE PICTURE!



WITH WESTON GASKETS and FORMS for ALL SEWER PIPE JOINTS

Minimizes infiltration, exfiltration and root intrusion. Although on curtailed production, due to shortage of materials and labor, we can still supply some of you and will welcome your inquiries now.

L. A. WESTON, ADAMS, MASS.

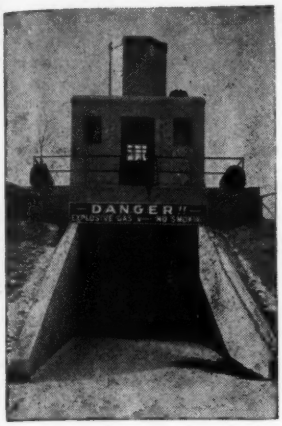


The Standard Source of Unbiased Information

About equipment and materials!

This Manual describes and illustrates *all* types of equipment and material for highways, streets and airports and tells what each can do. If you don't have a copy of this valuable Manual, send $1 for one today. Money back in 10 days if not entirely satisfied.

PUBLIC WORKS, 310 East 45th St., New York 17, N. Y.



Entrance to sludge control rooms, Cranston, R. I.

The Sewerage Digest

Abstracts of the main features of all important articles dealing with sewerage and sewage treatment that appeared in the previous month's periodicals.

Equipment for Postwar Construction

Manufacturers of sewage and water equipment believe that changes and improvements in the future will be gradual and evolutionary. The 52 questioned reported unanimously that an engineer could specify their products in accordance with the latest prewar catalogs and specifications with reasonable certainty that immediate postwar improvements would be no more upsetting than customary prewar improvements. Only two stated their intention to market any radically new product for immediate postwar use, but said that adequate data of these were already in engineers' hands.

Sewage equipment manufacturers have had to convert little of their plant to other products, but have used it for supplying their regular products for camps and other war purposes; therefore they can readily begin at once supplying postwar requirements.

Improvements in equipment are of course desired, such as those providing easier operation, and keeping clean, longer life, lower maintenance, lower first cost, lower operating cost, better appearance, easier installation, standardizing units, prompt repair parts service, well prepared operation and instruction books and helpful preliminary engineering data. These will not involve radical changes but will, as in the past, be minor refinements and gradual improvements.[C4]

Detroit's Postwar Sewerage Project

Detroit, Mich., established an official organization for advance planning, to include plans and specifications for capital improvements that would have been provided annually but for the war. Such a plan was prepared and has been adopted. A separate organization was established devoted exclusively to advance planning, called the "Civil-Sanitary Division," which is headed by an associate civil engineer and includes assistants and draftsmen. This division is preparing a master plan, to eliminate the danger of haphazard planning by evaluating the ultimate needs of the community as far as possible. Detroit's sewerage problem is mostly one of storm relief. In preparing a master plan for this, the 47-year rainfall record of the U. S. Weather Bureau was studied and rainfall frequency curves computed and used as a basis of run-off computations by the rational method. In deciding how distant a future present construction should provide for, on the basis of economy, an analytical study of costs indicated that the most economical procedure would be to install 75% of the ultimate requirements now and defer the remaining 25%. But it was assumed that all construction should provide for not less than 20 yr. in advance of the present needs. If ultimate development was expected more than 30 yr. in the future, the 75-25 rule could safely be applied.

On the basis of the master plan, engineering drawings are now being prepared for those portions that have been authorized; having been completed last October for $2,500,000 of the authorized $20,000,000 project and progressing since then at the rate of $2,000,000 of the project per month.[C5]

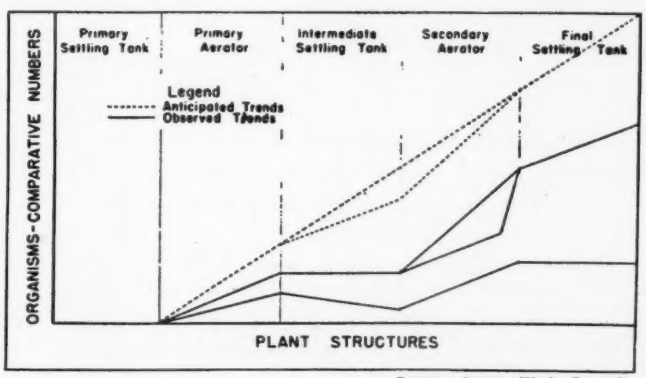
Disposal of Citrus Wastes

More than 800,000 tons of citrus fruits are processed each year in the United States. In canning, approximately 60% of the weight of the fruit is waste, consisting of the rind in internal fiber, adding this combined with large amounts of wash water to sewage in treatment plants is unsatisfactory because of the high acidity and B.O.D. In practically all plants the solids are separated from the liquid, and in many are converted into stock food, using large drying plants. The number of products that can be and are being made from citrus fruit has increased during the past few years through research and development work.

After passing through fine screens, the liquid is generally run out sand beds to drain and evaporate. The solids collecting on the surface are allowed to dry, are then raked off and burned.[L2]

Biology of The Hays Process

There are over 70 plants using the Hays process, about half of them in Army and Navy camps. The authors studied the biology of 11 such plants in Army camps, making a comprehensive qualitative survey of all types of biological growths found therein. They identified 71 groups, genera or species. It is claimed for this process that it utilizes organisms tolerant of very foul water at the influent end and that there is a transition through the plant until, near the outlet, organisms tolerant of only clean water are found. A gradient was found, but not that visualized. The only filamentous organisms found



Courtesy Sewage Works Journal

Trends of aerobic organisms in a Hays tank.

were two bacteria, one rather restricted in its metabolism to the sulfur cycle, the other to the carbon. Some of the bacteria are putrefactive but some are not.

Four of the plants produced effluents containing dissolved oxygen and in these, protozoa, rotifers, and worms characteristic of good activated sludge or trickling filters were abundant. The other seven plants showed no dissolved oxygen and in these the dominant protozoa were 5 genera of ciliates and four genera of flagellates; practically no amoeboid protozoa, rotifers or worms; this being characteristic of Imhoff tanks or foul waters. Great quantities of sulfur bacteria, both pigmented and colorless, were characteristic of all 11 plants, but the significance of their abundance was not determined.[C12]

Sewer Rates In Little Rock

Little Rock, Ark., has been financing its sewers since 1936 by making charges against owners of premises served, which were by State law a lien against such premises. At first the charges were based on the number of rooms in residences, offices and hotels, of employees in stores, etc. This required too much investigating and in 1937 was changed to rates based on the water consumption during December 1936 and January 1937, varying from 20 cts. per month where the water consumption had been less than 2,250 gal. per month, to $15 for 1,000,000 gal. or more. This again was unsatisfactory and was changed to 15% of the average monthly water bill for the preceding year, with a minimum of 20 cts. and a maximum of $100. Manufacturers who did not discharge all of their water to the sewer could meter that which did not and deduct it. With the water rate at 30 cts. per 100 cu. ft. this was satisfactory. But the water company dropped its rate to 25 cts. and the sewer revenue dropped $1,500 a month; so the sewer rates were raised to 18% of the average monthly water bill. It is now proposed to base the sewer charge on the amount of water used each month rather than the water bill, with charges varying from 5 cts. per 100 cu. ft. where the water consumption is 100 cu. ft. or less, to 1 ct. where the consumption exceeds 3,500 cu. ft.[G8]

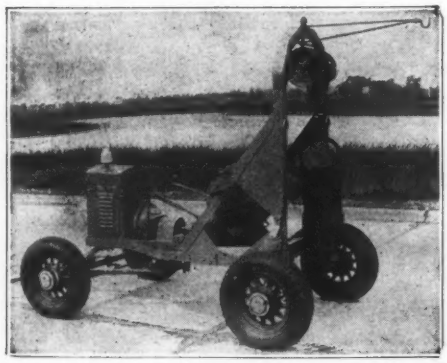
Operating a Sewage-Garbage Plant

The sewage treatment plant of Frederick, Md., which began operation in 1937, consists of screens, two rectangular clarifiers, two concentration tanks, two vacuum filters and an incinerator. Each concentration tank holds one day's flow of sludge. The concentrated sludge is carried by bucket elevator to a conditioning tank where ferric chloride and lime are added and mixed by compressed air. If the sludge contains more than the normal amount of grease, the dose of ferric chloride is increased and that of lime decreased. Each vacuum filter has an area of 100 sq. ft., and the two operating together can filter a 24 hr. accumulation of sludge in 3½ hr. actual filtering time. The dried sludge, containing 68 to 75% moisture, is burned in the incinerator, together with garbage and combustible rubbish.

At 4 a.m. fires are started in both chambers of the incinerator with combustible rubbish, and when a good bed of fire has formed, about 200 lb. of filter cake is added and the preheater started, bringing the temperature to 1,200° F. Then 8 cu. yd. of garbage and trash and 500 lb. of filter cake are fed each 15 min. and the temperature kept at 1,700° to 1,800°. The incinerator is operated for an average of 7½ hr. daily. When there is considerable wet garbage and grass cuttings, fuel may be necessary. For this, dry corn cobs (obtained from a grain elevator) are superior to coal or wood. Among items cremated in 1942 were 423 dogs, 58 cats and 1,365 skunks.

The only maintenance to the incinerator during the 5 years of operation has been relining the ceiling once, rebuilding the bridge between walls twice and relining arches over firing doors once a year. The 90 carborundum

KEEP THOSE SEWERS OPEN!



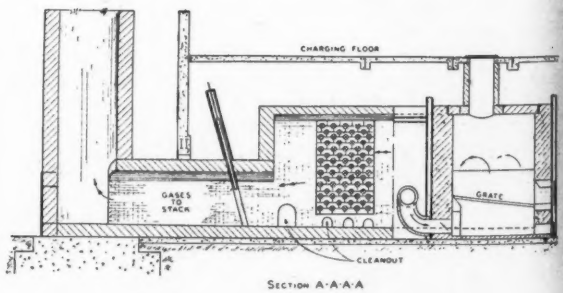
Sewers clogged with sand, roots and other debris are a constant danger to public health and safety. New installations rapidly lose their efficiency due to sand seepage.

You positively can keep the sewers of your city open with an OK Champion—the cleaner that does the entire job from street level. Dig-ups practically a thing of the past.

Three Distinctive Models Available. Write Now for Literature.

CHAMPION CORPORATION
4752 SHEFFIELD AVENUE, HAMMOND, INDIANA

"FITCH"
RECUPERATORS
FOR
INCINERATORS



SECTION A-A-A-A

AN INCINERATOR necessity is a good recuperator. "Fitch" Recuperators combine Thermal Conductivity, Great Strength and Accessibility.

Write for Bulletin No. 11
"RECUPERATORS FOR INCINERATORS"

FITCH RECUPERATOR CO.
PLAINFIELD NEW JERSEY

recuperator tubes have been replaced with 4" Class 150 cast iron pipe, since the former crack from time to time and the cast iron do not, and cost only 19% as much.[X2]

Bibliography of Sewerage Literature

The articles in each magazine are numbered continuously throughout the year, beginning with our January issue.

c. Indicates construction article; *n,* note or short article; *p,* paper before a society (complete or abstract); *t,* technical article; *article reviewed in the "Digest."

C *Sewage Works Journal*
November

1. The Ten-Year Plan of Sewage and Waste Treatment. By Morris M. Cohn. Pp. 1043-1045.
2. The Consulting Engineer and Postwar Planning. By Charles A. Emerson. Pp. 1045-1049.
3. The Canadian Point of View on Postwar Problems. By A. E. Berry. Pp. 1050-1054.
4. Postwar Projects of Sewage Works Equipment Manufacturers. By W. B. Marshall. Pp. 1054-1056.*
5. A Municipal Postwar Project for Sewerage Development. By Clyde L. Palmer. Pp. 1057-1061.*
6. High-Rate Biological Sewage Treatment. By Samuel A. Greeley. Pp. 1062-1087.*
7. Operating Experiences at Army Sewage Treatment Plants. By John T. Franks and Chester A. Obma. Pp. 1088-1095.*
8. Notes on An Accident at a Small Sewage Treatment Plant Resulting in the Deaths of Three Workers. By Allen D. Brandt. Pp. 1096-1100.*
9. The Significance of the Finding of the Virus of Infantile Paralysis in Sewage. By Kenneth F. Maxcy and Howard A. Howe. Pp. 1101-1114.*
10. Photoelectric Determination of Dissolved Oxygen With Amidol. By M. M. Ellis and M. D. Ellis. Pp. 1115-1118.*
11. The Effect of Various Treatment Processes on the Survival of Helminth Ova and Protozoan Cysts in Sewage. By Eloise B. Cram. Pp. 1119-1138.*
12. Some Biological Aspects of the Hays Process of Sewage Treatment. By James B. Lackey and R. M. Dixon. Pp. 1139-1152.*
13. Reduction of Moisture in Activated Sludge Filter Cake by Electro-Osmosis. By Robert E. Beaudoin. Pp. 1153-1163.
14. Industrial Wastes in Wartime. By F. W. Mohlman. Pp. 1164-1181.
15. Problems of Plant Operation and Coordination. By Walter E. Gerdel. Pp. 1183-1193.*
16. Wartime Effects on Treatment Plants. By T. C. Schaetzle. Pp. 1193-1196.*
17. Sampling and Its Relation to Sewage Treatment Plant Operation. By C. D. McGuire. Pp. 1199-1201.*
18. Sludge Concentration and Disposal at Marion, Indiana. By David Backmeyer. Pp. 1201-1207.*

D *The Surveyor*
December 3

4. *p.* Postwar Sewage Purification. By John T. Thompson. Pp. 499-500.
5. *p.* Sewage Works Records. Discussion of D 23. Pp. 505-507.

December 24

6. *p.* The Cyclo-Nitrifying Filter. By James H. Edmondson and Stanley R. Goodrich. Pp. 533-534.

G *Water Works & Sewerage*
December

2. Recirculating Filters for Treatment of Slaughterhouse Wastes. By E. F. Eldridge. Pp. 449-451.*
3. The Little Rock Sanitary Sewer System. By T. W. Clapham. Pp. 459-462.*

H *Sewage Works Engineering*
January

5. Explosion Wrecks Pumping Station. By Clinton L. Bogert. Pp. 8-11.*
6. Storm Water Interception Corrects Overtaxed System. By Newell L. Nussbaumer. Pp. 12-14, 39.
7. Mechanical Maintenance Methods. Pp. 15-16, 34.
8. Equipment Maintenance in Time of War. By Morris M. Cohn. Pp. 20-23.

J *American City*
January

2. Revision of New Brunswick, N. J., Treatment Plant. Pp. 52-53.

L *Civil Engineering*
January

2. Disposal of Citrus Wastes. By Howard W. Hall. Pp. 15-17.*

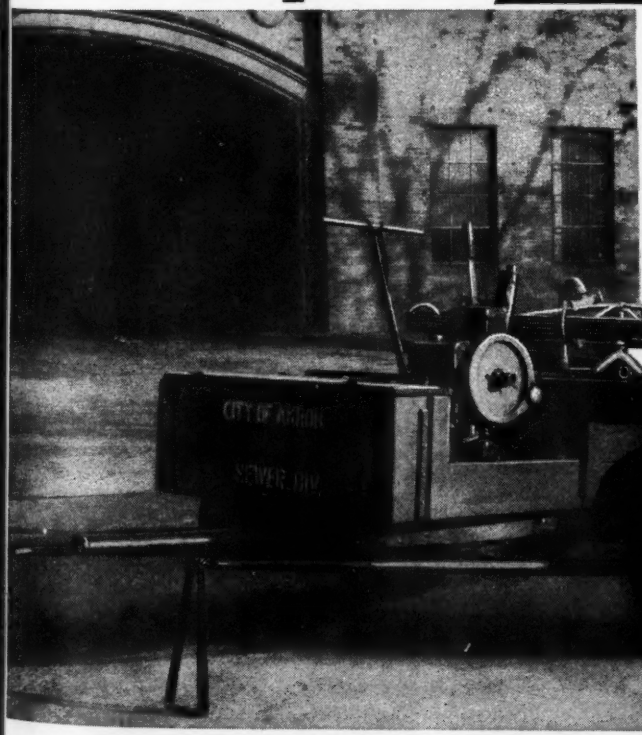
P *Public Works*
January

5. Lake Forest Sewer Survey and Construction of Relief Sewers. By Neil N. Campbell. Pp. 13-16.
6. *n.* Small Septic Tanks Need Good Engineering. P. 16.
7. *n.* Common Use of Privately Constructed Sewer Line. P. 20.
8. Waste Disposal With Several Unusual Features. Pp. 28, 30.
9. Operating Imhoff-Trickling Filter Plants. Pp. 30, 32.

X *Proceedings, Maryland-Delaware Water & Sewerage Ass'n*
Year of 1943

1. War Sanitation, 1861-1918. By James R. McComas. Pp. 19-36.
2. Operation of the Frederick Municipal Disposal Plant. By Arthur H. Culler. Pp. 53-60.*
3. The Needs, Functions and Objectives of the Sanitary Engineering Procurement and Assignment Service. By C. W. Klassen. Pp. 84-87.

Ready to Go Right Now!



Make your sewer department as modern as your fire department. Alert sewer superintendents are mounting their FLEXIBLE "EZY" Rod Reels permanently on trucks or trailers — ready for immediate effective action. Be prepared to handle emergency stoppages quickly with FLEXIBLE tools.

FLEXIBLE SEWER ROD EQUIPMENT CO.
9059 VENICE BLVD.
LOS ANGELES 34, CALIF.
401 BROADWAY, NEW YORK 13, N.Y.
PICKWICK BLDG.
KANSAS CITY 6, MO.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Keeping Up With New Equipment

Omega Joins Builders Group

H. S. Chafee, Treasurer of Builders Iron Foundry, Providence, R. I., and L. E. Harper, President of Omega Machine Company of Kansas City, Mo., announce a consolidation whereby the latter becomes a wholly owned subsidiary of Builders Iron Foundry. Mr. Harper continues as President and Director of Omega and that company will continue at its present location, 3409 East 18th St., Kansas City.

Builders Iron Foundry, one of the old New England firms, was established in 1820. Since 1889 this Company has acquired a world-wide reputation as manufacturers of "The Venturi Meter." Builders comprehensive line of flow meters, controllers, gauges, etc., is now distributed by Builders-Providence, Inc., a division of the parent company. Builders products for measuring and controlling the flow of liquids and dry materials, recording and controlling liquid level, etc., are extensively used in water and sewage disposal plants and also find a variety of applications in industrial plants.

The Omega Machine Company, established in Kansas City in 1928 by Mr. E. E. Harper, has developed a line of related products including both volumetric and gravimetric dry feeders and continuous lime slakers. Under the leadership of Mr. L. E. Harper, Omega has made noteworthy strides, and today its feeders for granular and powdered dry materials such as activated carbon, soda ash, lime, and the like are standard equipment in water and sewage plants. During the past few years Omega has handled an expanding volume of orders for war plant facilities, necessitating new and larger quarters which are now available for its rapidly growing business.

Builders has engaged in the manufacture of special war products during World War II, the fourth major conflict in which the Company has served our armed forces in this manner. Recently, and for the third time during this war, the "men and women of Builders Iron Foundry" have won the Army-Navy "E" for "high achievement in the production of war material."

This merger brings together Builders-Providence, Omega and Builders' associate company %Proportioneers, Inc.%—three fine organizations, each a specialist in its own field. %Proportioneers%, as engineers and manufacturers, produce a complete line of liquid chemical feeders employed in the treatment of water and sewage, as well as proportioning devices for industrial process blending and treating. Mr. R. P. Lowe, President of %Proportioneers% joins Messrs. Chafee and Harper in the anticipation that this merger will be mutually beneficial particularly in helping them to serve more effectively the several industries for which their products are designed.

LaPlant-Choate's New Dozer

LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa

Outstanding among the new earthmoving equipment units being introduced by LaPlant-Choate Manufacturing Co., Inc., as a part of its post-war program, is the "Adjustadozer." This is a new type of dozer designed so its blade may be tilted in four positions—sixteen inches up or down at either end of blade and 3¼ inches forward or backward at top and bottom. In addition it can be held in straight bulldozing position. The blade can also be raised forty-five inches above the ground line and dropped seventy-two (six feet) below ground level. In raising a powerful lift is developed. This model is cable operated.

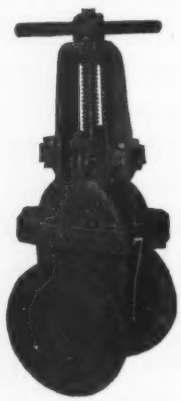
The backward and forward tilting of the blade is a

VALVES, HYDRANTS
BY RENSSELAER

Made BY Leaders FOR Leaders

Many products will receive your attention in connection with POST WAR PLANNING.

As the final test of merit, we invite you to "ask the man who uses RENSSELAER."



Write for BULLETIN X

Write for BULLETIN W

RENSSELAER VALVE CO.
TROY, NEW YORK

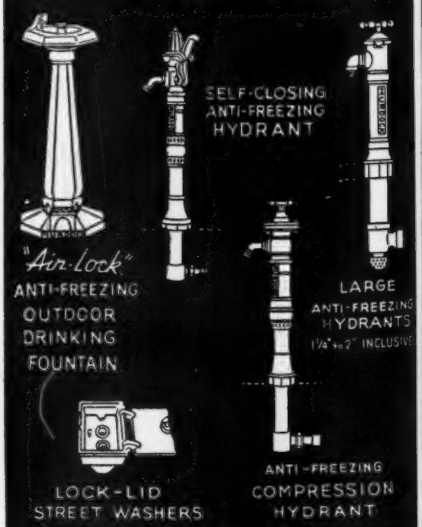
MURDOCK HISTORY
From 1853 to Present Day
"Murdock" All the Way

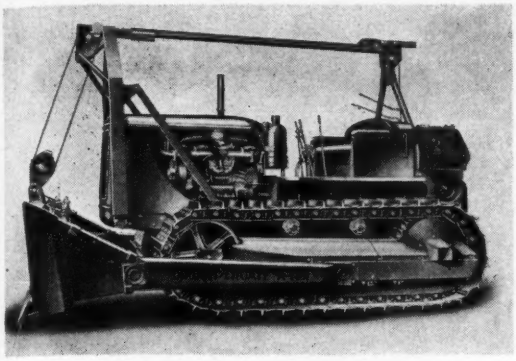
"To design and build Outdoor Water Service Devices better than anyone else" is the reason for the success that this company has enjoyed.

In all the years we haven't heard of a buyer who regretted purchasing Murdock Fixtures.

THE MURDOCK MFG. & SUP. CO.
426 PLUM ST. CINCINNATI 2, OHIO

MURDOCK SINCE 1853


SELF-CLOSING ANTI-FREEZING HYDRANT
"Air-Lock" ANTI-FREEZING OUTDOOR DRINKING FOUNTAIN
LARGE ANTI-FREEZING HYDRANTS 1¼" to 2" INCLUSIVE
LOCK-LID STREET WASHERS
ANTI-FREEZING COMPRESSION HYDRANT



LaPlante-Choate "Adjustadozer."

special feature of this machine. The blade is adjusted through a simple screw jack mechanism operated by a ratchet lever. The adjusting mechanism is equipped with regulating gauges which indicate when the blade is level, at its maximum tilt down at either end, and when tilted forward or backward.

The use of these regulating gauges is an exclusive LaPlant-Choate feature. They simplify and remove all guesswork in adjusting the blade and make it possible for one person to completely adjust one side of the machine before going to the other side to make a final adjustment. The gauges not only indicate that the proper adjustments have been made but also result in increased production because of the proper roll given the blade.

These various blade positions enable the "Adjustadozer" to perform a wide variety of earthmoving jobs. The tilt of the blade permits it to be used for opening shallow "V" ditches and doing hillside work, while the forward and backward tilt enables it to work effectively in different kinds of material, from loose dirt to rock. This tilt is also advantageous in leveling.

The unit is designed for mounting on a Caterpillar D7 tractor.

Hercules Grip-Lug

Hercules Steel Products Co.
Erie County Bank Bldg., Buffalo, N. Y.

In cooperation with the government plan for the conservation of metal, this company has produced a specially constructed work-hardened alloy steel that it claims will save 85% of the metal.

Worn grouser shoes cause the tractor to slide and slip all over, stealing essential traction, increasing gasoline consumption and straining the motor. By applying Hercules Grip-Lugs to the distressed grouser, maximum traction is restored and peak power returns to the motor. Restoring traction by "retreading" with Grip-Lug involves a simple welding process. Because of its distinctive groove and bevel designed by engineers, all that is required is the spotting of a bead along the edges that fastens the Lug to the grouser shoe. The revitalized tread sticks like a vise, bites deeper and because of its quality is stronger than the original grouser.

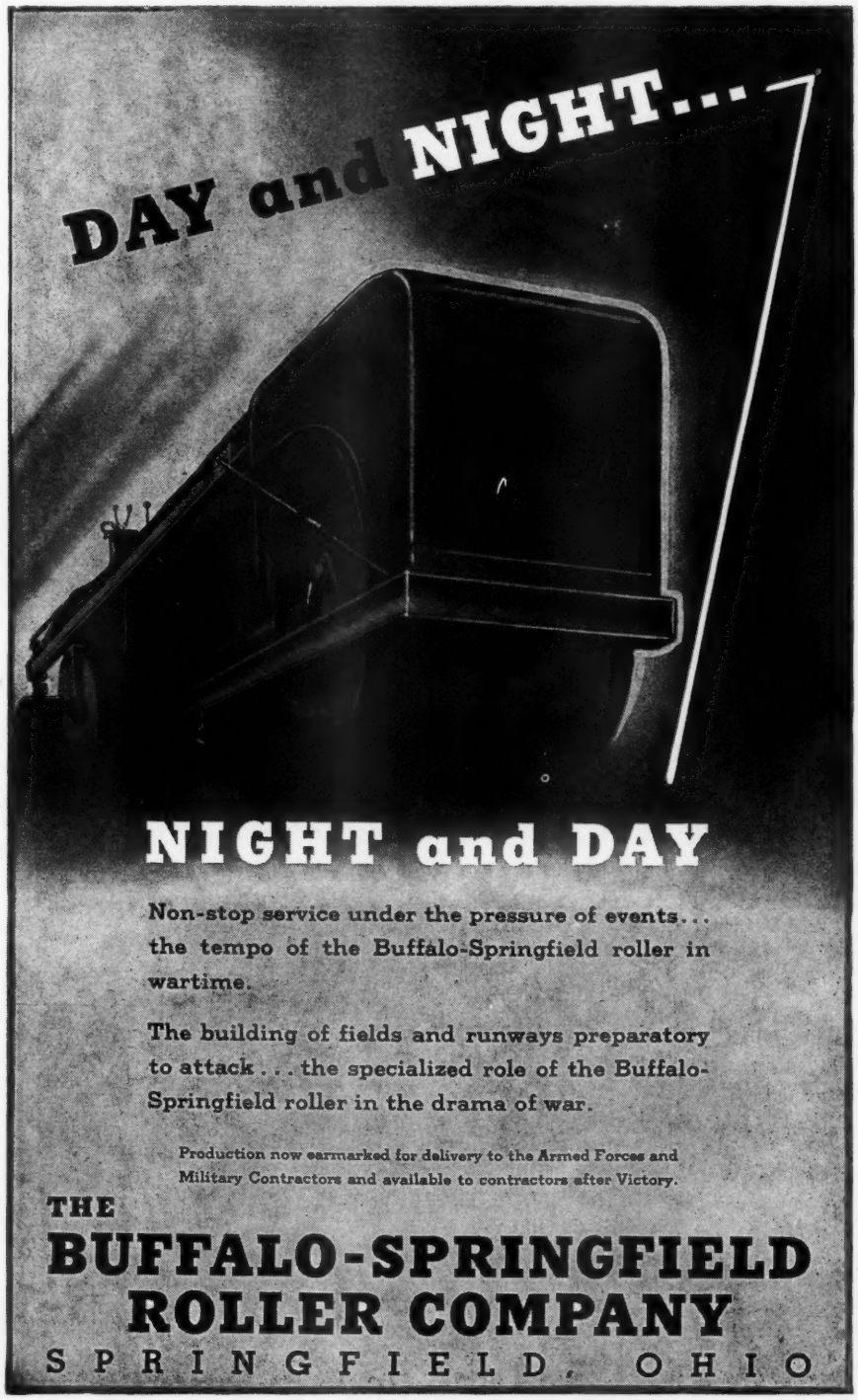
Instructive literature describing the special devise is available upon request to the manufacturer.

New Bruning 55C Printer Speeds Semi-Photographic Reproductions

Charles Bruning Co., Inc.
4700 Montrose Ave., Chicago, Ill.

Designed to take full advantage of the time-saving features inherent in semi-photographic reproduction processes, a new printer, especially adapted to this type of work, has just been announced.

Used with the new semi-photographic materials, this new printer, known as the Bruning 55C Continuous Photographic Printer, provides clear and faithful duplicates of anything typed, printed, photographed or drawn. The 55C is a 42-inch printer, yet, owing to the exceptional compactness of its design, requires floor space of only 40 x 62 inches. It may be used either inside or outside of the dark room, and operates either with roll stock or cut sheets.


DAY and NIGHT...
NIGHT and DAY
Non-stop service under the pressure of events... the tempo of the Buffalo-Springfield roller in wartime.
The building of fields and runways preparatory to attack . . . the specialized role of the Buffalo-Springfield roller in the drama of war.
Production now earmarked for delivery to the Armed Forces and Military Contractors and available to contractors after Victory.
THE
BUFFALO-SPRINGFIELD
ROLLER COMPANY
SPRINGFIELD, OHIO

With a speed of 0 to 18 feet per minute, the Model 55C embodies improvement in light source and light control which assure maximum line opacity and clear, contrasting prints. Either of its two fluorescent lamps, one white and one amber, may be used in making exposures, depending upon the nature of the originals. The printing light is effectively sealed for darkroom use. A constant speed motor drives the variable speed transmission which is controlled by a knob easily in reach of the operator's hands. Speed changes are instant and positive. Further control of exposure is obtained by a unique shutter arrangement which varies the exposure space from 0 to 14 inches. Both the speed of the machine and the shutter are individually controlled.

The Pre-load System—Prestressed Concrete Construction

The Preload Company
420 Lexington Ave., New York

The system is described by the company as: a system of reinforced concrete construction involving a different relation between steel and concrete. In the case of a tank steel bands are tensioned around a concrete shell similarly to their use in wood stave construction. The tensioning of the bands compresses the concrete as wood staves are compressed. The filling of the tank elongates the shell and slightly increases the tension in the bands. The important result however has to do with the concrete. Instead of being tensioned in conjunction with the steel as the tank is filled it releases compression. This is the feature of the Preload System and the basis of its success. Without tension concrete does not crack. Liquid tightness and permanence are thus accomplished.

In the walls of the conventional concrete water tank, water fills the minute cracks and freezes during cold weather. The expansion of the ice gradually breaks down the concrete and the walls soon become unsightly and ineffective. In an attempt to offset this it is usual to design the walls to be exceptionally heavy. Sometimes the thickness is thirty-six inches or more while the floor, having the greatest head, may have a thickness under six inches. This would be entirely inconsistent were it not for the factors cited in the previous paragraph.

The walls of a Preload Tank need be no thicker than the floor except for the requirements of prestressing. Prestressing is also applied vertically to prevent horizontal cracking which would occur due to temperature differences and shrinkage. Release of compression in place of tension is the answer. Preload walls neither crack nor leak and are permanent.

A folder describing and illustrating the Preload System will be sent on request.

University of Michigan Training Sanitary Engineers for Army and Navy

Sanitary engineers are added to the already varied list of technical men being trained at the University of Michigan, Ann Arbor, for the Army and Navy. Two 12-week courses are given jointly by the college of engineering and the school of public health. Mostly graduate civil and chemical engineers, the work they will take is largely on the post graduate level.

The Dean Emergency Valve Operator

Payne Dean & Co.,
Laconia, N. H.

The Dean Valve Operator is a complete mechanism for transmitting as much power as is needed from the truck engine to the vertical valve key shaft and providing complete control thereof, of both speed and power. A heavy duty ball bearing power take off is provided for attachment to the truck transmission and having one speed to close and one to open. Either push and pull or lever gear shifting attachment is mounted in the cab within reach of the operator. This take off is connected by a 1¼" dia. drive shaft and two heavy duty Universal

HEAVY-DUTY INCINERATION
MORSE BOULGER
DESTRUCTORS
FOR THE
INCINERATION OF MUNICIPAL WASTES
GARBAGE, RUBBISH, SEWAGE SCREENINGS AND SLUDGE
FOR COMPLETE INFORMATION CALL OR WRITE
MORSE BOULGER DESTRUCTOR CO.
Home Office: 205-P East 42nd St., New York 17, N. Y.

Cafe Monaco
CONTINENTAL
HANNA BUILDING, CLEVELAND, OHIO
One of the most distinguished Restaurants between New York and Chicago
THE NATURAL MEETING PLACE FOR MIDWESTERN BUSINESS MEN

for ACCURACY and TROUBLE-FREE OPERATION
in WATER and SEWAGE TREATMENT and in Chemical Proportioning for all Processing Industries.
Engineered and Manufactured by
Insist on the WILSON PULSAFEEDER
Literature on Request
WILSON CHEMICAL FEEDERS, INC.
KX4 211 CLINTON STREET • EST. 1923 • BUFFALO 4, N.Y.

STREET, SEWER AND WATER CASTINGS
Made from wear-resisting chilled iron in various styles, sizes and weights.
MANHOLE COVERS, WATER METER COVERS, ADJUSTABLE CURB INLETS, GUTTER CROSSING PLATES, VALVE AND LAMPHOLE COVERS
Write for Catalog and Prices
SOUTH BEND FOUNDRY CO.
Gray Iron and Semi-Steel Castings
SOUTH BEND, IND.

The Manual of Sewage Disposal Equipment and Sewer Construction is a year 'round exhibit of the latest equipment and materials.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

enclosed in an oil tight casing having 1¼" extension shafts and connected by ⅝" pitch roller chain to the main cross shaft. Means are provided for chain adjustment. The cross shaft is 1½" dia. mounted in ball bearings and connected to the operating head by a Universal joint and shear coupling.

The operating head is ruggedly constructed, consisting of a cast iron casing in which is mounted a bevel gear reduction immersed in oil. The gears are of chrome steel with spiral teeth, the thrust being taken by ball thrust bearings. The main gear contains a universal attachment, through which the valve operating shaft passes. All shafts operate in bronze bushed bearings provided with Alemite lubrication. By the use of the universal feature, the vertical shaft may be from 12 to 15 degrees out of alignment with the valve nut and the truck may even have two wheels on the curb.

Almost any truck of 1½ ton or more, regardless of age, can be used for power, provided the transmission is prepared for attachment of a power take off. The installation of the Valve Operator is below the truck floor and does not interfere in any way with the use of the truck for other purposes. The machine is made in two models—a heavy duty and a junior and it is claimed it will close any gate valve regardless of size. Write for a folder which tells all about this useful emergency valve operator.

New Sewage and Trash Pump Catalog

Yeomans Bros. Co.
1433 Dayton St., Chicago 22, Ill.

In a 32-page book all data, descriptions and details on the extensive line of pumps made by Yeomans are given. It includes new selection tables, new installation drawings, up-to-date specifications and many illustrations.

Write the manufacturers for Bulletin 6201 and a copy of this valuable new catalog will be promptly mailed to you.

New Zeolite Water Softener Catalog

Graver Tank & Mfg. Co.
East Chicago, Ind.

A 16-page catalog by Graver describes Manual, Semi-Manual, and Full Automatic Zeolite Water Softeners. It is claimed that Graver Zeolite Softener performs the softening as well as the regenerating cycles with a minimum of attention: it works silently and thoroughly without any need for proportioning and feeding chemicals, such as lime, without adjustment of flow rates, and with no complications due to disposal of sludge.

The catalog includes data on selecting Manual or Automatic equipment; selecting Standard or High Capacity Zeolite; typical plant layouts, etc.

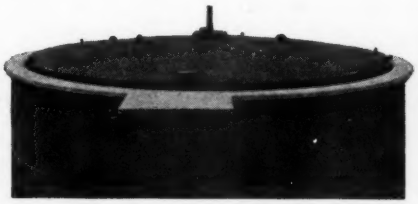
Copies of this water softening catalog are available upon request to Graver Tank & Mfg. Co.

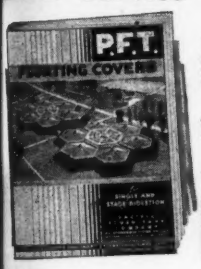
Modern pH and Chlorine Control

W. A. Taylor & Co.
7304 York Rd., Baltimore 4, Md.

A completely revised 83 page combination handbook and catalog (6th edition), of value to every water, sewage and power plant engineer, is available from W. A. Taylor & Co. Fifty pages are devoted to (1) a simple, non-technical explanation of the meaning of pH control and the methods for making colorimetric determinations; (2) precautions to be observed; (3) discussion of the application of pH and chlorine control to 31 different fields, including water purification and softening, sewage disposal, boiler water, etc.; (4) a technical discussion of the

Over 225 P.F.T. Floating Covers in War Service





The health of our fighting men and war workers is being safeguarded by modern sewage disposal plants. We are doing our part by delivering on time P.F.T. Floating Covers and other sewage treatment equipment.

The P.F.T. Floating Cover for single and stage digestion hastens the digestion process, and provides for utilizing the sewage gas to heat water for the digestor tank.

Catalog No. 232 contains complete information, including specifications. Write for your copy.

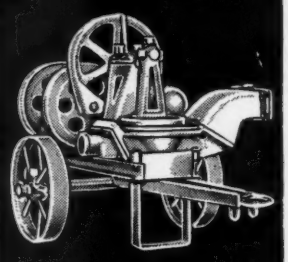
P.F.T. PACIFIC FLUSH-TANK CO.
4241 Ravenswood Ave., Chicago, Ill.
NEW YORK—CHARLOTTE, N. C.

C. H. & E. CONSTRUCTION EQUIPMENT

Single and Double Diaphragm Pumps

Diaphragm pumps have a definite place in the dewatering pump field. Slow speed and low cost, for pumping sewers and footings where slow seepage and extremely dirty water is encountered. 3" and 4" single and double types. Capacities to 12,000 G. P. H.

Write for Bulletin
3841 N. PALMER STREET



SAW RIGS · PUMPS · HOISTS · MORTAR MIXERS · TANDEM ROLLERS · BAR BENDERS · BAR CUTTERS
C. H. & E. Manufacturing Co.
Milwaukee, Wis.

THE COAGULANT THAT CUTS COSTS

TENNESSEE CORPORATION Ferri-Floc FERRIC SULPHATE

Write today for actual case histories of water plants now using Ferri-Floc.

Tennessee Corporation
ATLANTA, GEORGIA LOCKLAND, OHIO

40 Years of WATER PURIFICATION

FOR MORE THAN FORTY YEARS

We have specialized in the art of water purification. We manufacture a full line of Water Filters, both pressure and gravity types; Zeolite Water Softeners; Swimming Pool Recirculating Equipment; and various forms of Water Rectification Units. Inquiries are invited on all problems of water treatment.

ROBERTS FILTER MFG. CO.
640 COLUMBIA AVE. DARBY, PA.

When writing, we will appreciate your mentioning PUBLIC WORKS

meaning of pH control. These four sections bring together, in condensed form, information which cannot be obtained elsewhere except by reference to innumerable textbooks and original articles. The remaining 33 pages contain descriptions of Taylor Slide Comparators for general pH and chlorine control, determination of phosphates in boiler water and for analysis of water for nitrites, nitrates, silica, iron, ammonia, etc. A copy will be sent free on request.

Hough Issues Tractor Folder

The Frank G. Hough Company, Libertyville, Illinois, has just issued an attractive 4-page folder describing its Payloader (1 cu. yd.) Tractor Shovel—Model HL. This complete unit is ideal for material handling or construction work at Airports, Army Camps, Ordnance Plants, Public Utilities, Municipalities, Highways. The Tractor is exceptionally versatile; properly balanced, powered on the large rear wheels, a rugged digger and fast loader. Many of the jobs it is designed to do are illustrated in the folder which will be mailed on request.

Dolan Is New President of Mathieson Alkali Works, Inc.

E. M. Allen announces his retirement as President of The Mathieson Alkali Works (Inc.) effective January 1, 1944, and the election of G. W. Dolan as his successor. Mr. Allen will continue to hold his office as Chairman of the Board of Directors of the Company.

Mr. Allen became President of the Company in 1919 and since 1938 has been Chairman of the Board and President.

G. W. Dolan

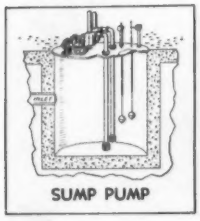
Mr. Dolan joined the Mathieson organization in 1930; has held various positions of responsibility and in 1941 was elected Executive Vice President of the Company.

CARTER Model 701-1½A Self-Priming Industrial Pump

The present day type of this simple, compact, highly efficient and low-initial-cost pump was pioneered by CARTER, who has contributed more than any other manufacturer to its evolution and wide adoption in public works and private industry.

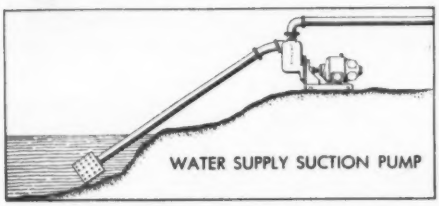
EXCLUSIVE FEATURES of the CARTER Close-coupled type pictured above include *Renewable Bronze Pump Shaft*, obviating expensive delays and replacements after extensive shaft wear . . . and *Flexibility of Motor Drive*, allowing use of any standard make of ball bearing motor. As the priming operation does not depend upon any Trick Impeller or Volute, CARTER Pumps follow the latest proven designs used in high grade non-priming centrifugal pump construction and have the same non-clogging and high efficiency characteristics.

Here are a few of the many fields in which CARTER Self-Priming Pumps are efficiently and economically "doing the job":



SUMP PUMP

SUMP PUMPS . . . replacing older vertical submerged type. **ADVANTAGES** include accessibility of pump and motor, and elimination of long shaft with bearing, vibration and lubrication problems • **CARTER** Self-Priming Pumps may be placed alongside or away from sump pit, as may be desirable in some industrial locations.



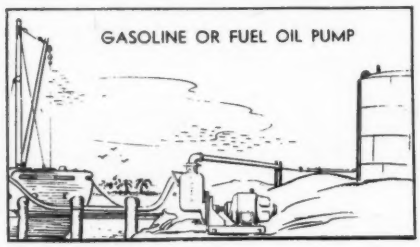
WATER SUPPLY SUCTION PUMP

WATER SUPPLY SUCTION PUMPS

Wherever the supply source is within suction limit, a CARTER Self-Priming Pump should meet your need. Combines simplicity and efficiency of Centrifugal Pump with suction lift ability of Plunger or Rotary Pump. These CARTER Pumps are widely used by the Army and Navy for permanent and mobile water supply units, as well as by industry. • In PUBLIC and PRIVATE SWIMMING POOLS they "vacuum clean" and render filter service . . . and in CONSTRUCTION DEWATERING, CARTER Self-Primers have proven themselves to be "tough pumps for tough jobs."

GASOLINE OR FUEL OIL PUMPS

In this work CARTER Self-Priming Pumps are serving at home and abroad, giving tiptop service under all sorts of adverse conditions.



SEAL RING

CARTER Self-Priming Pumps are equipped with stuffing box or seal ring type seal pictured. Either construction provides an effective, trouble-free method of sealing the pumped liquid at rotating shaft. Replacing seal ring or renewal of packing is an easily accomplished operation, requiring only a few moments time.

• • •

We invite you to submit your pumping problem to our Engineering Department whose experience and skill are at your command. Further details of CARTER Self-Priming Pumps are covered in our Bulletin PW-4310 which will be mailed upon request.

RALPH B. CARTER COMPANY

Main Office HACKENSACK, N. J. *New York Office* 53 Park Place, NEW YORK 7

***When writing, we will appreciate your mentioning* PUBLIC WORKS**

CONVENTIONS

February 17-18 — Association of North Atlantic States, 20th annual meeting, will be held in the Hotel Pennsylvania, New York City.

February 23-24—First Illinois State Asphalt Conference with the cooperation of the Illinois Division of Highways at Springfield. The conference is being handled by a General Conference Committee composed of all interests directly and indirectly connected with the Asphalt Industry. H. B. Pullar, Vice President of the Asphalt Institute, is Chairman. The program will be devoted to an open-forum discussion of Asphalt's uses, primarily in Illinois. Among the speakers are Walter A. Rosenfield, Director of Illinois Dept. of Public Works, and Wesley W. Polk, Chief Engineer of the Division of Highways.

March 23-24—New Jersey Sewage Works Association holds 29th annual meeting at Stacy-Trent Hotel, Trenton, N. J.

Sanitary Engineering Branch Now a Division in the Army

Joseph J. Gilbert has been promoted to Lt. Colonel, Sanitary Corps, from Major, effective January 1, 1944. On the same date the Sanitary Engineering Branch, Surgeon General's Office, of which Colonel W. A. Hardenbergh,

Sn. C. (formerly Associate Editor and Vice President of Public Works Magazine), has been Chief since its formation, was promoted to the status of a Division, with Colonel Hardenbergh as Director and Lt. Colonel Gilbert as Assistant Director.

Link-Belt Elects Vice-Presidents

R. F. Bergmann

W. C. Carter, president of Link-Belt Company, Chicago, announces the election by the Board of Directors, of two vice-presidents, effective January 1, 1944.

E. L. Berry, vice-president and general manager of Link-Belt Ordnance Company, has been elected vice-president of Link-Belt Company, the parent organization. Mr. Berry, who began his Link-Belt career in 1941, has for many years devoted his time particularly to matters of production and personnel. His new headquarters will be at the company's general office, 307 N. Michigan Ave., Chicago.

Richard F. Bergmann, company chief engineer, has been elected a vice-president of Link-Belt Company, with headquarters at the company's general office, Chicago, as heretofore. Mr. Bergmann came to Link-Belt in 1924, through the purchase of Howe Chain Co., Muskegon, Mich.

John E. Martin has been appointed manager of Link-Belt Ordnance Co., with headquarters at the plant. Mr. Martin started his Link-Belt career in 1927, and since Pearl Harbor has been assistant to Brigadier General G. M. Wells, War Dept., Washington, D. C.

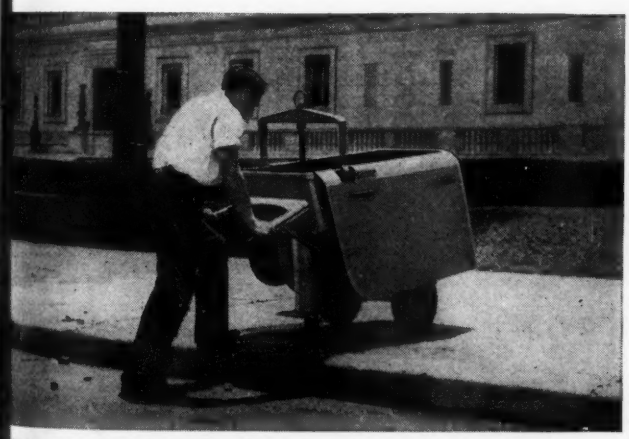
Meter Company Official Dies

W. H. Parker

Walter H. Parker, Vice President in Charge of Manufacturing, Pittsburgh Equitable Meter Company, died suddenly on Tuesday, December 28, 1943, in his home at Pittsburgh, Pa., from a heart attack following the contraction of pneumonia. He was 51 years old. Mr. Parker was a graduate of North Carolina State College of Agriculture and Engineering at Raleigh, N. C. In 1929, he was Chief Engineer for the Fry Equipment Company of Rochester, Pa. He was a Captain in the Air Corps in the first World War, and was honored with a citation for the development of a synchronizing principle for firing bullets between the blades of airplane propellers. During the present war Mr. Parker contributed many valuable innovations in the development and manufacture of medium caliber armor-piercing shot. He was a member of the Pittsburgh Athletic Association and the American Legion.

New Sales Manager

National Cast Iron Pipe Co., Birmingham, Ala., is a division of James B. Clow & Sons, and Henry E. Skibbe, 2 Rector St., New York 6, N. Y., is sales manager of the New York offices for both.



CUT MAINTENANCE COSTS 75%

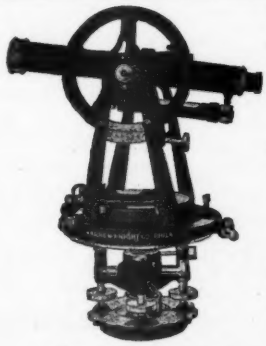
Concrete slab maintenance costs can be reduced as much as 75% by the Koehring Mud-Jack Method. The Mud-Jack raises sunken concrete walks, curbs and gutters, driveways, streets, and airport runways eliminating reconstruction costs. Write for the new Mud-Jack Bulletin which is both illustrative and descriptive.

KOEHRING COMPANY
Milwaukee, Wisconsin

MUD-JACK METHOD

JAEGER "SURE" PRIME
The Pumps That Exceed Their Promises — Every Unit Tested and Certified

THE JAEGER MACHINE COMPANY
400 Dublin Ave., Columbus 16, Ohio



WARREN - KNIGHT
TRANSITS and LEVELS
are precision instruments of highest quality.

Stocks are limited—due to our facilities being used in making special precision instruments for the U. S. Government—but priority orders are being accepted, and filed, as quickly as possible.

Guaranteed Rebuilt Transits and Levels for Sale or Rent.

We are prepared to REPAIR Engineering Instruments of *any* make and to furnish Engineering Field Equipment and Drafting Room Supplies of all kinds.

Write for Catalogue PW-92

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 N. 12th ST. PHILA. 7, PA., U. S. A.

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

DIRECTORY OF CONSULTING ENGINEERS

ALBRIGHT & FRIEL, Inc.

Consulting Engineers

WATER, SEWERAGE, INDUSTRIAL WASTE, GARBAGE, POWER PLANT AND VALUATION PROBLEMS

1520 Locust St. Philadelphia, Penna.

Charles B. Burdick Louis R. Howson
Donald H. Maxwell

ALVORD, BURDICK & HOWSON

Engineers

Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation

Civic Opera Building Chicago

BLACK & VEATCH

Consulting Engineers

Sewerage, Sewage Disposal, Water Supply, Water Purification, Electric Lighting, Power Plants, Valuations, Special Investigations, Reports and Laboratory Service

R. B. Black N. T. Veatch, Jr.
A. P. Learned H. F. Lutz
F. M. Veatch J. F. Brown
E. L. Filby

4706 Broadway, Kansas City, Missouri

CLINTON L. BOGERT

Consulting Engineer

WATER SUPPLY AND TREATMENT
SEWERAGE AND SEWAGE TREATMENT

624 Madison Avenue
New York, 22, New York

BUCK, SEIFERT AND JOST

Consulting Engineers
(FORMERLY NICHOLAS S. HILL ASSOCIATES)

Water Supply Sewage Disposal
Hydraulic Developments
Reports, Investigations, Valuations, Rates, Design, Construction, Operation
Management, Chemical and Biological Laboratories

112 East 19th Street New York City

JAMES M. CAIRD

Assoc. Am. Soc. C. E.

Chemist and Bacteriologist

Water Analysis and Tests of Filter Plants

Office and Laboratory
Cannon Bldg., Broadway & 2nd St.
Troy, N. Y.

A. W. DOW, Inc.

Chemical Engineers

Consulting Paving Engineers
Mem. Am. Insti. Ch. Engrs.

Asphalt, Bitumens, Tars, Waterproofing, Paving, Engineering, Materials

801 Second Avenue New York

WILLIAM A. GOFF

Consulting Engineer

Private and Municipal Engineering
Sewerage, Sewage Disposal
Water Supply and Treatment
Garbage, Refuse, Industrial Wastes
Design, Supervision, Valuations, Reports

Broad St. Station Bldg., Philadelphia

J. W. GOODWIN ENGINEERING CO.

MUNICIPAL AND CONSULTING ENGINEERS

Design and Construction Supervision

Air Ports, Waterworks; Sewerage, Sewage Treatment, Water Treatment, Gas Systems, Street Improvements, Reports, Appraisals

Birmingham, Alabama

GREELEY AND HANSEN

Engineers

Samuel A. Greeley Paul Hansen
Paul E. Langdon Kenneth V. Hill
Thomas M. Niles Samuel M. Clarke

Water Supply, Water Purification, Sewerage, Sewage Treatment, Flood Control, Drainage, Refuse Disposal

6 N. Michigan Ave. Chicago 2
299 Broadway New York 7

HOWARD R. GREEN CO.

Consulting Engineers

DESIGN AND SUPERVISION OF MUNICIPAL IMPROVEMENTS

Water Works and Treatment—Sewers and Sewage Disposal—Investigations and Valuations

208-10 Bever Bldg., Cedar Rapids, Iowa
Established 1913

WM. S. LOZIER, INC.

Consulting Engineers

Wm. S. Lozier C. E. Elmendorf
A. B. Squire

Sewerage, Sewage Disposal, Water Supply, Water Purification, Refuse Disposal

10 Gibbs Street Rochester, N. Y.

METCALF & EDDY

Engineers

Airfields, Water, Sewage, Drainage, Flood Relief, Garbage and Industrial Wastes Problems

Laboratory Valuations

Statler Building, Boston

MALCOLM PIRNIE

Engineer

Water Supply, Treatment, Sewerage
Reports, Plans, Estimates,
Supervision and Operation,
Valuation and Rates

25 W. 43d St. New York, N. Y.

RUSSELL & AXON

Geo. S. Russell—John C. Pritchard
Joe Williamson, Jr.—F. E. Wenger

Consulting Engineers, Inc.

Sewerage, Sewage Disposal, Water Works, Filtration, Softening, Power Plants

4903 Delmar Blvd. St. Louis, Mo.

J. E. SIRRINE & COMPANY

Engineers

Water Supply & Purification
Sewage & Industrial Waste Disposal
Stream Pollution Reports
Utilities, Analyses

Greenville South Carolina

FOSTER D. SNELL, Inc.

An organization of 30 chemists and engineers having laboratories for bacteriology, analyses, research and physical testing rendering

Every Form of Chemical Service

Disposal of sanitary and industrial waste. Water supply and purification Consultation

305 Washington St. Brooklyn, N. Y.

MICHAEL BAKER, JR.

The Baker Engineers

CIVIL ENGINEERS AND PLANNERS - MUNICIPAL ENGINEERS
Airport Design - Sewage Disposal Systems - Water Works Design & Operation
Consulting Services - Surveys and Maps
HOME OFFICE - ROCHESTER, PA.
San Antonio—Dallas—Seattle—Jacksonville—Pittsburgh—Harrisburg—Recife, Brazil

---

ROBERT AND COMPANY

INCORPORATED

Architects and Engineers

Water Supply
Sewage Disposal

ATLANTA, GEORGIA

Incinerators
Power Plants

GANNETT, EASTMAN & FLEMING, Inc.

Harrisburg, Pennsylvania

ENGINEERS

Preparation of Post War Reports and Plans

When you need special information—consult the classified READER'S SERVICE DEPT., pages 63-65

Readers' Service Department

These booklets are FREE but distribution is restricted to those actively engaged in engineering or construction. Use the coupon below or write the manufacturer direct, mentioning PUBLIC WORKS.

Construction Materials and Equipment

Cold Mix Plants

15. New catalogs and prices of Portable Bituminous Mixers in 6 to 14 ft. sizes for resurfacing and maintenance. Issued by The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Cold or Wet Weather Construction

18. Cleaver Aggregate Heaters and Dryers, Hot Water Boosters, and Automatic Steam plants are designed to speed up cold or wet weather construction. Write for illustrated bulletins. Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

Concrete Accelerators

31. New 48-page booklet in five sections explains clearly the effects, advantages and methods of using Calcium Chloride and Portland Cement mixes. Complete and packed with practical information; well illustrated; pocket size. Sent free on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

Concrete Curing

33. 64-page manual of concrete curing with calcium chlorides. Complete, handy. Contains useful tables, well illustrated. Write the Columbia Chemical Division, Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

Concrete, Early Strength

38. 64-page manual tells how to speed up year 'round concreting, shows how to secure high early strength and greater workability at temperatures either below or above freezing. Contains many actual examples of practical concreting operations; well illustrated with more than 60 photos, charts, graphs and tables. Calcium Chloride Assn., Penobscot Building, Detroit 26, Mich.

Concrete Mixers

44. Catalog and prices of Concrete Mixers, both Tilting and Non-Tilt types, from 3½S to 56S sizes. The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

Drainage Products

70. Standard corrugated pipe, perforated pipe and MULTI PLATE pipe and arches — for culverts, sewers, subdrains, cattlepasses and other uses are described in a 48-page catalog entitled "ARMCO Drainage Products," issued by the Armco Drainage Products Association, Middletown, Ohio, and its associated member companies. Ask for Catalog No. 12.

Graders, Patrol

105. The Austin-Western 99M Power Grader with its powerful all wheel drive simplifies all construction and maintenance; handles difficult jobs with economy and efficiency; and does better work on grading, ditching, scarifying, snow plowing, loading, mixing, bulldozing, shoulder trenching and backsloping. Write for Bulletin 1946. Austin-Western Road Machinery Co., Aurora, Ill.

Mixing Plants, Asphalt

106. The Cleaver Asphalt Mixing Plant for an inexpensive plant mix and the Cleaver Tank Car Heater and Bituminous Booster are covered in illustrated catalogs sent on request by Cleaver-Brooks Co., 3112 W. Center St., Milwaukee, Wis.

Mud-Jack Method

107. How the Mud Jack Method for raising concrete curb, gutter, walls and street solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities — a new bulletin by Koehring Company, 3026 West Concordia Ave., Milwaukee, Wis.

Oil, Motor

109. "Here's Proof of Ring-Free Superiority," 32 pages, illustrated, outlines the principles of lubrication and explains how by simple tests you can measure the advantages of Macmillan Ring-Free Motor Oil. Write Macmillan Petroleum Corp., 530 West 6th St., Los Angeles, Calif.

Paving Materials, Bituminous

111. New "Tarvia Manual" is packed with useful data on how to build and maintain roads with Tarvia. Each step is illustrated with excellent action pictures, 64 pp. 103 ills. Write to The Barrett Div., 40 Rector St., New York, N. Y.

Pumps

120. Interesting new booklet tells how to lengthen the life of your pumps. Explains how a little care will save a lot of wear. Write today for your copy. Homelite Corp., 2403 Riverdale Ave., Portchester, N. Y.

121. New illustrated catalog and prices of Jaeger Sure Prime Pumps, 2" to 10" sizes, 7000 to 220,000 G.P.H. capacities. also Jetting, Caisson, Road Pumps, recently issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

123. New brochure by Gorman-Rupp Co., Mansfield, Ohio, illustrates and describes many of the pumps in their complete line. Covers heavy duty and standard duty self-priming centrifugals, jetting pumps, well point pumps, triplex road pumps and the lightweight pumps.

124. 16-page illustrated bulletin, SP-37, describes and illustrates complete C. H. & E. line of self-priming centrifugal pumps from ½" to 8", including lightweight models for easy portability. C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

125. "Self-Priming Centrifugal Pumps," a 12-page illustrated booklet showing details of construction of Carter Pumps. Ask for Bulletin 4310. Address: Ralph B. Carter Co., Hackensack, N. J.

Road Building and Maintenance

128. Motor Patrol Graders for road maintenance, road widening and road building, a complete line offering choice of weight, power, final drive and special equipment to exactly fit the job. Action pictures and full details are in catalogs Nos. 253, 254 & 255, issued by Gallion Iron Works & Mfg. Co., Gallion, Ohio.

129. Warco Hydraulic Control Motor Graders, Duplex Hydraulic Scoops and Whizzard, easily transported, rollers are described and illustrated in literature available from W. A. Riddell Corp., Bucyrus, Ohio.

Rock Drill Maintenance

130. New booklet presents through amusing cartoons useful hints on proper rock drill maintenance methods—what your men can do to get more work out of your tools with a minimum of expense for repairs and compressed air. Write The Cleveland Rock Drill Co., 3734 East 78th St., Cleveland, Ohio.

Rollers

133. New Tu-Ton roller of simple construction for use in rolling sidewalks along highways, playgrounds and other types of light rolling is fully described in a bulletin issued by C. H. & E. Mfg. Co., 3841 No. Palmer St., Milwaukee, Wis.

138. "The Buffalo-Springfield line of road rollers (tandem, 3-wheel, and 3-axle) are described in the latest catalog issued by the Buffalo-Springfield Roller Co., Springfield, Ohio."

139. "Ironeroller 3-Axle Roller for extra smooth surfaces on all bituminous work. Booklet contains roller data and operation details. Hercules Co., Marion, Ohio.

140. This well-illustrated 16-page catalog describes the tandem, autocrat, cadet, and roll-a-plane rollers, and explains what each is intended to accomplish. Write Austin-Western Road Mach. Co., Aurora, Ill.

Rotproofing

145. Cuprinol, a rotproofing chemical that protects wood from fungi and insects, yet has no offensive odor, is non-poisonous, does not corrode metal and can be painted over. Get full details in booklet from Cuprinol, Inc., 7 Water St., Boston, Mass.

Soil Stabilization

150. "High-Service, Low Cost Roads" is one of the newer booklets using an effective combination of picture and text to set forth the principles and advantages of road surface stabilization with calcium chloride. Complete, interesting and well illustrated 34 pages. Sent by Solvay Sales Corp., 40 Rector St., New York, N. Y.

152. The Columbia Chemical Division will be glad to furnish to anyone interested complete information dealing with Calcium Chloride Stabilized Roads. This literature contains many charts, tables and useful information and can be obtained by writing Columbia Chemical Div., Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa.

154. "Soil Stabilization with Tarvia"—An illustrated booklet describing The steps in the stabilization of roadway soil with Tarvia will be mailed on request by The Barrett Div., 40 Rector St., New York, N. Y.

155. Sterling Rock Salt for Frost Damage Prevention. Sterling Rock Salt for Base and Surface Stabilization. Two descriptive bulletins issued by International Salt Co. Inc., Scranton, Pa.

Spreader

187. Jaeger Paving equipment, including Mix-in-Place Roadbuilders, Bituminous Pavers, Concrete Bituminous Finishers, Adjustable Spreaders, Forms, etc.—4 complete catalogs of latest equipment in one cover, issued by The Jaeger Machine Company, 400 Dublin Ave., Columbus 16, Ohio.

USE THIS COUPON

Readers' Service Dept., PUBLIC WORKS 2-44
310 East 45th St., NEW YORK 17, N. Y.

Please send me without obligation the following booklets listed in your READERS SERVICE SECTION .....
(indicate by numbers)

Name .....

Occupation .....

Street .....

City ..... State .....

Surface Consolidation and Maintenance

188. Detailed and illustrated presentation of the method and procedure in consolidated operations; explains how sub-soils can be conditioned to resist softening and frost action; how surfacing can be consolidated to provide smooth all-weather riding surfaces; how they can be maintained so as to prevent disintegration and gravel loss. Write the Calcium Chloride Association, Penobscot Bldg., Detroit 26, Mich., for Bulletin No. 29.

Transits and Levels

190. Transits, levels, and drafting room supplies: New Catalog just issued. 56 pages giving full illustrated descriptions of surveying instruments and accessories. Address: Warren-Knight, 136 N. 12th St., Philadelphia, Pa.

Wellpoints

195. New complete catalog, "Griffin Pointed Wellpoint Facts," just issued. Covers pre-drainage, describing wellpoints jetting pumps, with tables, diagrams and illustrations. Griffin Wellpoint Corp., 881 E. 141st St., New York.

Street and Paving Maintenance

290. "Blacktop Road Maintenance and Construction Equipment" — Asphalt and tar kettles, flue type kettles, spray attachments with completely submerged pumps, tool heaters, surface heaters, road brooms, portable trail-o-rollers, etc. These are all described in detail and illustrated. This modern and up-to-date equipment for blacktop airport and road construction and maintenance is based upon experience and engineering research over a period of 42 years. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, O.

Fire Apparatus

300. Detailed information and advice about specially engineered Ward LaFrance apparatus will be sent on request. Ward LaFrance Div., Elmira, N. Y.

Snow Fighting

Snow Plows

350. "Frink One-Way Sno-Plows" is a four page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow. Features, specifications and method of attaching. Carl H. Frink, Mfr., Clayton, 1000 Islands, N. Y.

Ice Control

351. "Make Icy Highways Safe for Traffic"—a new bulletin by Michigan Alkali Div., Wyandotte Chemicals Corp., Wyandotte, Mich., tells how to use calcium chloride for modern ice control.

352. Ice Prevention on Highways, Streets, and Airport Runways with Sterling "Auger Action" Rock Salt. An illustrated bulletin issued by International Salt Co. Inc., Scranton, Pa.

Sanitary Engineering

Aero-Filter

356. Aero-Filter Design Data is given in a new 32-page catalogue. It contains information on Advantages of Aero-Filter Process, Single Stage vs. Multi Stage Treatment, Filter Loadings, Rates of Flow and Results, Filter Depths, Recirculation, Sewage Pumps and Pump Control. Approximately 15 pages of blue prints are included in this instructive catalogue. Write Lakeside Engineering Co., 222 W. Adams St., Chicago, for a copy.

Air Release Valves

357. Automatic Air Release Valves for water, sewage and industrial uses are described and illustrated in new catalog issued by Simplex Valve & Meter Co., 6750 Upland St., Philadelphia, Pa.

Analysis of Water

360. "Methods of Analyzing Water for Municipal and Industrial Use" is an excellent 94 page booklet with many useful tables and formulas. Sent on request by Solvay Sales Corp., 40 Rector St., New York, N. Y.

Activation and Aeration

367. A valuable booklet on porous diffuser plates and tubes for sewage treatment plants. Covers permeability, porosity, pore size and pressure loss data, with curves. Also information on installations, with sketches and pictures, specifications, methods of cleaning and studies in permeability. 20 pp. illustrated. Sent on request to Norton Company, Worcester, Mass.

Blowers

370. All interested in low cost air for sewage disposal will want a copy of this catalog describing operating principles and specifications of Roots-Connersville Aerating Blowers. Write to Roots-Connersville Blower Corp., 301 Valley Ave., Connersville, Ind.

Chlorinators, Portable

379. Complete data on new portable chlorinator designed to meet emergency calls quickly and efficiently. Write Wallace & Tiernan Co., Inc., Newark 1, N. J.

380. "Emergency Sterilization Equipment," a new bulletin describing the advantages of Dual Drive Chlor-O-Feeders which can serve as either a permanent chemical feeder or as a portable emergency chlorinator. Order from Proportioneers, Inc., 96 Codding St., Providence, R. I.

Cleaning Sewers With Own Forces

386. 32-page illustrated booklet explains how a city can clean its sewers and culverts with its own forces using the up-to-date Flexible Sewer Rod equipment. Illustrates and describes all necessary equipment. Issued by Flexible Sewer Rod Equipment Co., 9059 Venice Boul., Los Angeles, Calif.

387. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Three sizes of machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Consulting Engineers

389. "Who, What, Why" outlines briefly the functions of the consulting chemist and chemical engineer. Covers various methods of cooperation, on different types of problems, with industry, with attorneys and with individuals. Foster D. Snell, Inc., 305 Washington St., Brooklyn, N. Y., will send a copy on request.

Feeders, Chlorine, Amonia and Chemical

392. For chlorinating water supplies, sewage plants, swimming pools and feeding practically any chemical used in sanitation treatment of water and sewage. Flow of water controls dosage of chemical; reagent feed is immediately adjustable. Starts and stops automatically. Literature from % Proportioneers, Inc. % 96 Codding St., Providence, R. I.

393. New circular describes and illustrates the Var-I-Feeder, a new portable chemical feeder for water main sterilization, military use or other chemical treatment. Write Chem-Feeds, Inc., 77 Reservoir Ave., Providence, R. I.

394. Everson Sterelators for all kinds of chemical feeding in stationary and portable models are described in new bulletins issued by Everson Manufacturing Co., 214 West Huron St., Chicago 1, Ill.

399. Pulsafeeders. A flow-proportional liquid chemical feeder, reciprocating type, fluid motor driven. Operating parts completely isolated from the chemical being fed. Micrometer adjustment. For feeding against high or low pressure. Wilson Chemical Feeders, Inc., 211 Clinton St., Buffalo 4, N. Y.

Filters

402. How to increase the capacity of filters through use of Anthrafilt and complete data on use of Anthrafilt for filters and sludge beds is contained in a revised pocket Manual issued by Anthracite Equipment Corp. For free copy write H. G. Turner, State College, Pa.

Fire Hydrants

405. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M & H Valve & Fittings Co., Anniston, Ala.

406. See listing No. 436.

407. Fire hydrants which are flood proof, easy to operate and service are described in Rensselaer Bulletin W., formerly known as "Coreys." Address: Rensselaer Valve Co., Troy, N. Y.

Flow Meters

409. The primary devices for flow measurement—the orifice, the pilot tube, the venturi meter and others—and the application to them of the Simplex meter are described in a useful 24-page booklet (42A). Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Gas Holders and Digesters

411. Digesters and Gas Holders for efficient collection and storage of sewage gas are described in an interesting illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill.

Gates, Valves, Hydrants

413. Gate, flap and check valves; floor stands and fittings. New catalog No. 36 gives detail information with dimensions for all types of new full line. M. & H. Valve & Fittings Co., Anniston, Ala.

414. Complete booklet with much worthwhile water works data describes fully Ludlow hydrants and valves. Sent on request. Ludlow Valve Mfg. Co., Troy, N. Y.

415. See listing No. 436.

416. Check valves of the Clear-Way, Quiet-Closing type which eliminate "Slam" are described in Rensselaer Bulletin V. Made in expanding outlet type, as well as straight-thru type, for bolting direct to pump discharge. Address: Rensselaer Valve Co., Troy, N. Y.

Gauges

421. The full line of Simplex gauges for filtration plants are illustrated and described in catalog issued by Simplex Valve and Meter Co., 6750 Upland St., Philadelphia, Pa.

Laboratory Equipment

423. pH and Chlorine Control. A discussion of pH control and description of comparators, chlorimeters and similar devices. An 80-page booklet. W. A. Taylor & Co., 7301 York Road, Baltimore, Md.

Manhole Covers and Inlets

429. Street, sewer and water castings in various styles, sizes and weights. Manhole covers, water meter covers, adjustable curb inlets, gutter crossing plates, valve and lamphole covers, ventilators, etc. Described in catalog issued by South Bend Foundry Co., Lafayette Boul. and Indiana Ave., South Bend, Ind.

Meters, Venturi

432. New bulletin illustrates Builders Air Relay system of transmission for the Venturi Meter which is particularly useful for liquids containing suspended solids like sewage. Eliminates corroson, clogged pipes, etc. Write Builders-Providence, Inc., Codding St., Providence, R. I.

433. "The Selection of Main Line Meters," a highly informative and useful presentation prepared by a competent engineer, J. C. Thoresen, describes forms of differential producers and quickly solves typical problems with the use of graphic charts. Write Builders-Providence, Inc., 9 Codding St., Providence, R. I.

Meters, Water

434. Six types of iron case cold water meters built for the duration, but to last for years are illustrated and described fully in folder issued by Pittsburgh Equitable Meter Co., 400 No. Lexington Ave., Pittsburgh, Pa.

Pipe, Cast Iron

435. Handbook of Universal Cast Iron Pipe and Fittings, pocket size, 100 pages, illustrated, including 14 pages of useful reference tables and data. Sent by The Central Foundry Co., 386 Fourth Ave., New York 16, New York.

436. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super-deLavaud centrifugally-cast and pit-cast pipe. Bell-and-spigot, U. S. Joint flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Burlington, N. J.

437. "Cast Iron Pipe and Fittings" is a well illustrated 44 page catalog giving full specifications for their complete line of Sand Spun Centrifugal Pipe, Fire Hydrants, Gate Valves, Special Castings, etc. Will be sent promptly by R. D. Wood Co., 400 Chestnut St., Philadelphia, Pa.

Pipe, Lock Joint

440. Lock Joint Reinforced Concrete Sewer Pipe. Pressure Pipe, Culvert Pipe, Centrifugal Pipe and Subaqueous Pipe is described and illustrated in bulletins available from Lock Joint Pipe Co., Ampere, N. J.

Pipe, Transite

442. Two new illustrated booklets, "Transite Pressure Pipe" and "Transite Sewer Pipe" deal with methods of cutting costs of installation and maintenance of pipe lines and summarize advantages resulting from use of Transite pipes. Sent promptly by Johns-Manville Corp., 22 East 40th St., New York, N. Y.

Pipe Joints Sewer

444. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston, Adams, Mass.

Pipe Joint Compounds

446. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in a 16-page illustrated booklet issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Pumps, Sludge

447. Carter Sludge Pumps are described in 8-page illustrated bulletin, including specifications and tables. Address: Ralph B. Carter Co., Hackensack, N. J.

Pumps and Well Water Systems

449. Installation views and sectional scenes on Layne Vertical Centrifugal and Vertical Turbine Pumps fully illustrated and including useful engineering data section. Layne Shutter Screens for Gravel Wall Wells. Write for descriptive booklets. Advertising Dept., Layne & Bowler, Inc., Box 186, Hollywood Station, Memphis, Tenn.

450. Peerless pumps in a variety of types, with oil or water lubrication and any power drive, to pump water from any depth are described and illustrated in new literature that clearly shows their construction and special features. Write Peerless Pump Div., Food Machinery Corp., 301 W. Ave. at 26th St., Los Angeles, Calif.

451. Oil lubricated turbine pumps with open impellers. Five types of heads available. Specifications and illustrations in new bulletin 6930M-2 issued by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill.

Meter Setting and Testing

454. The most complete catalog we have seen on setting and testing equipment for water meters—exquisitely printed and illustrated 48-page booklet you should have a copy of. Ask Ford Meter Box Co., Wabash, Ind.

Screens

456. Be assured of uninterrupted, constant automatic removal of screenings. Folder 1587 tells how. Gives some of the outstanding advantages of "Straightline Bar Screens" (Vertical and Inclined types). Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

Sludge Drying and Incineration

458. "Disposal of Municipal Refuse." Complete specifications and description including suggested form of proposal; form of guarantees; statements and approval sheet for comparing bids with diagramatic outline of various plant designs. 48 pages. Address: Morse Boulger Destructor Co., 205-P East 42nd St., New York 17, N. Y.

459. Recuperator tubes made from Silicon Carbide and "Fireclay" Corebusters for maximum efficiency are described and illustrated in bulletin No. 11 issued by Pitch Recuperator Co., Plainfield National Bank Bldg., Plainfield, N. J.

460. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Nichols Engineering and Research Corp., 60 Wall Tower, New York, N. Y.

Softening

462. This folder explains the process of Zeolite water softening and describes and illustrates the full line of equipment for that purpose made by the Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill. Includes flow charts, tables and other valuable data. Write for a copy of this instructive folder.

463. Water Softening. The use of the Spaulding Precipitator to obtain maximum efficiency and economy in water softening is described in a technical booklet. Permutit Co., 330 W. 42nd St., New York 18, N. Y.

Sprinkling Filters

466. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Swimming Pools

468. Data and complete information on swimming pool filters and recirculation plants; also on water filters and filtration equipment. For data prices, plans, etc., write Roberts Filter Mfg. Co., 640 Columbia Ave., Darby, Pa.

Taste and Odor Control

470. "Taste and Odor Control in Water Purification" is an excellent 92-page, illustrated booklet covering sources of taste and odor pollution in water supplies and outlining the various methods of treatment now in use. Every water works department should have a copy. Write Industrial Chemical Sales Div., 230 Park Ave., New York, N. Y.

471. Technical pub. No. 207 issued by Wallace & Tiernan Co., Inc., Newark 1, N. J., describes in detail taste and odor control of water with BREAK-POINT Chlorination, a method of discovering the point at which many causes of taste may be removed by chlorination with little or no increase in residual chlorine. Sent free to any operator requesting it.

Treatment

475. Three types of clarifiers for sewage treatment are illustrated and described in a new bulletin issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill.

476. "Safe Sanitation for a Nation," an interesting booklet containing thumbnail descriptions of the different pieces of P.F.T. equipment for sewage treatment. Includes photos of various installations and complete list of literature available from this company. Write Pacific Flush Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

477. All-steel Rotary Distributors, correctly designed for the small and medium sized sewage plants, are the subject of a new, well illustrated booklet issued by Graver Tank & Mfg. Co., 332 South Michigan Ave., Chicago, Ill. This booklet also covers distributors for various types of high-rate trickling filters.

478. New booklet (No. 1642 on Link-Belt Circuline Collectors for Settling Tanks contains excellent pictures; drawings of installations, sanitary engineering data and design details. Link-Belt Company, 2045 W. Hunting Park Ave., Philadelphia.

479. New 16-page illustrated catalog No. 1742 on Straightline Collectors for the efficient, continuous removal of sludge from rectangular tanks at sewerage and water plants. Contains layout drawings, installation pictures, and capacity tables. Address Link-Belt Co., 2045 West Hunting Park Ave., Philadelphia, Pa.

480. New illustrated folder (1942) on Straightline apparatus for the removal and washing of grit and detritus from rectangular grit chambers. Address: Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.

481. "Sedimentation with Dorr Clarifiers" is a complete 36-page illustrated catalog with useful design data. Ask The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

483. A combination mechanical clarifier and mechanical digester, The Dorr Clarigester, is explained and illustrated in a bulletin issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

484. Preflocculation without chemicals with the Dorrco Clariflocculator in a single structure is the subject of a new booklet issued by The Dorr Company, 570 Lexington Ave., New York 22, N. Y.

485. Dorrco Monorake for existing rectangular sedimentation tanks, open or closed, is described and illustrated in a new catalog sent on request. The Dorr Co., 570 Lexington Ave., New York 22, N. Y.

487. The complete line of Jeffrey equipment for water, sewage and industrial wastes treatment is illustrated and described in a handsome, new, 40-page catalog just issued by The Jeffrey Mfg. Co., 947-99 North Fourth St., Columbus 16, Ohio.

488. "Packaged" Sewage Treatment Plants, specifically developed for small communities—100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., Dept. PW, 2300 Wolfram St., Chicago 18, Ill.

Underdrains, Trickling Filter

492. Illustrated bulletin describes the Natco Unifilter block of glazed, hard burned clay for underdraining filter beds. Write National Fireproofing Corp., Pittsburgh, Pa., for free copy.

Valves (See Gates, Air Release, etc.)

Water Treatment

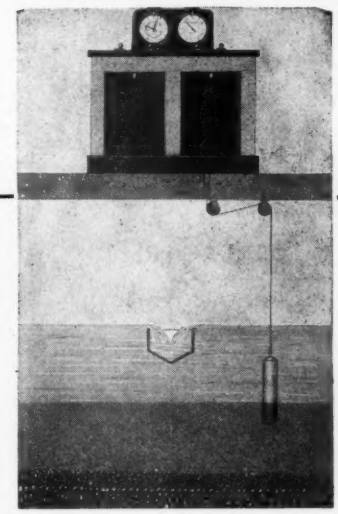
495. If you have a water conditioning problem of any kind, write Graver Tank & Mfg. Co., 332 So. Michigan Ave., Chicago, Ill., who manufacture all types of conditioning equipment and will be pleased to make recommendations.

496. "Use of copper sulphate in water treatment plants" titles informative booklet, with valuable data on chemicals, dosage, etc. Write Tennessee Corporation, Atlanta 1, Ga.

497. Ferri-floc Ferric Sulphate — a new, valuable booklet on coagulation for water and sewage treatment plants. Write Tennessee Corporation, Atlanta 1, Ga.

Water Service Devices

500. Data on anti-freeze outdoor drinking fountains, hydrants, street washers, etc., will be sent promptly on request to Murdock Mfg. & Supply Co., 426 Plum St., Cincinnati, Ohio.



SAND EXPANSION GAUGE
FOR ACCURATE WASH CONTROL

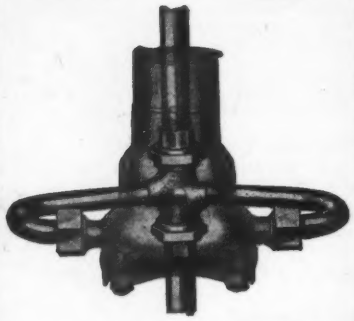
Engineered on a new high-torque principle, this BUILDERS Gauge performs independently of changes in wash water flow, pressure or temperature. Operator can accurately control both the *extent* and the *rate* of sand expansion in the filter bed during washing. Enthusiastically approved by filter plant operators. Write for Bulletin 335. Address Builders-Providence, Inc. (Division of Builders Iron Foundry), 9 Codding St., Providence 1, R. I.

"BLUE PRINT NOW"

Sincerely Yours,

BUILDERS - PROVIDENCE

NOT Available BUT....



. . . the Ford COPPERHORN makes the very best water meter setting for most basement installations. Learn why and plan accordingly for your post-war work.

Send for our catalog now.

FORD Meter Box Co.,
WABASH, INDIANA

Scarsdale, N.Y., Appoints Village Manager

Reeves Newsom has been appointed Manager for the Village of Scarsdale, N. Y., and will assume the duties of that position on March 1st. He succeeds the late Arthur Boniface, whose salary is reported to have been $13,000 a year.

Mr. Newsom is a graduate of Purdue University with a degree in Civil Engineering. Following a year's postgraduate work at M.I.T., he was in the employ of the city of Lynn, Mass., for 12 years, first as engineer on water supply construction, then as superintendent and finally as commissioner and chief engineer of the water department. In 1926 he became executive vice-president and, in 1932, president of the Community Water Service, which owns and operates over forty water works plants in several states. He resigned in 1937 to enter private practice as a consulting engineer specializing in water supply, sewerage, and other hydraulic problems, enlarging in 1941 to the partnership of Newsom & Aldrich, with offices in New York and Williamsburg, Virginia. The activities of that firm during the past two years included the design and supervision of construction of additional water supplies for Norfolk, Newport News, and the Hampton Roads area of Virginia, the cost of which exceeded $7,000,000. Mr. Newsom is a past president of the American Water Works Association.

You can reach the whole CITY-COUNTY market effectively through this ONE magazine: PUBLIC WORKS

ADVERTISERS IN THIS ISSUE

Albright & Friel, Inc. 62
Alvord Burdick & Howson 62
Atlas Mineral Products Corp. 45

Baker, Jr., Michael 62
Barrett Div. 67
Black & Veatch 62
Bogert, Clinton L. 62
Briggs & Stratton Corp. 42
Buck, Seifert & Jost 62
Buffalo Springfield Roller Co. 57
Builders-Providence, Inc. 66

Cafe Monaco 58
Caird, James M. 62
Carter Co., Ralph B. 60
Cast Iron Pipe Research Assn. ..... 34 & 35
Central Foundry Co. 3
Champion Corp. 54
C. H. & E. Manufacturing Co. 59
Chem-Feeds, Inc. 66
Cuprinol, Inc. 44

DeWitt Hotels 44
Dorr Company 4
Dow, A. W., Inc. 62

Everson Mfg. Co. 52

Fairbanks, Morse Co. 8
Fitch Recuperator Co. 54
Flexible Sewer Rod Equipment Co. 55
Ford Meter Box Co. 66
Frink Mfr., Carl H. 33

Gannett, Eastman & Fleming, Inc. 62
Goff, William A. 62
Goodwin Engrg. Co., J. W. 63
Gorman-Rupp Company 47
Graver Tank & Mfg. Co. 10
Greeley & Hansen 62
Green Co., Howard R. 62
Griffin Wellpoint Corp. 50

Industrial Chemical Sales Div. 37
International Salt Co. 38

Jaeger Machine Co. 61

Koehring Co. 61

Layne & Bowler, Inc. 29
Littleford Brothers, Inc. 6
Lozier & Co., Wm. S. 62

Macmillan Petroleum Corp. 1
Metcalf & Eddy 62
Morse Boulger Destructor Company 58
Murdock Mfg. & Supply Co. 56

Pacific Flush Tank Co. 59
Philadelphian Hotel 47
Peerless Pump Div. 36
Permutit Co., The 51
Pirnie, Malcolm 62
Pittsburgh Equitable Meter Co. ..... Front Cover
Proportioneers, Inc. 27

Rensselaer Valve Co. 56
Riddell Corp., W. A. 39
Robert & Co., Inc. 62
Roberts Filter Manufacturing Co. 59
Russell & Axon Cons. Engrs., Inc. 62

Simplex Valve & Meter Co. 43
Sirrine & Co., J. E. 62
Snell, Inc., Foster D. 62
South Bend Foundry Co. 58

Tennessee Corp. 59

U. S. Pipe & Foundry Co. 48

Wallace & Tiernan Co., Inc. ..... Back Cover
Ward LaFrance Truck Div. 9
Warren-Knight Co. 61
Weston, L. A. 53
Wilson Chemical Feeders, Inc. 58
Wood Co., R. D. 43
Worthington-Gamon Meter Co. 31

The new VAR-I-FEEDER Is Readily Applicable To Field Conditions as you Find Them!

Wired with Chem-Feed standard connections for control from small water meters, three stock Var-I-Feeders were shipped to the above illustrated job.

The customer's large, (8x3) Sparling Compound water meter, with a maximum capacity of over 1000 gallons per minute, had been on duty for years, and was handling average flows of over 500 gallons per minute. For installation in the Sparling, Chem Feeds, Inc. furnished a special contact switch for sending electric time interval signals to the chemical feeding plant which is located 300 feet from the meter pit.

Both Var-I-Feeders shown are proportionally paced by the water flowing through the meter, so as to feed hypochlorite solution for sterilization of the water supply, and glucosite, for corrosion control, into the customer's water piping system. Although both units are automatically flow responsive, Finger-Tip-Control allows ready adjustment by the operator, thus providing immediate changes in the sterilization or corrosion feed at will. A spare unit is shown on the storage shelf ready for any other emergency chemical feed operation or for standby to the two feeders now in use.

Made in both stationary and portable models, The Var-I-Feeder comes both as a constant rate or porportional type controlled by water meter.

Ask for Chem-Feeds Bulletin No. 77 To-Day!

CHEM-FEEDS, Inc.
RESERVOIR AVENUE & ALVIN STREET
PROVIDENCE 7, RHODE ISLAND